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USSR Report

CONSTRUCTION AND EQUIPMENT

No. 6

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GENERAL, SPECIFIC URBAN DEVELOPMENT PROGRAMS

Construction Units for Ukraine

Kiev STROITEL'STVO I ARKHITEKTURA in Russian No 11, Nov 79 pp 18-19

[Article by Candidate of Architecture N. S. Volga and Architect G. I. Fil'varov: "Ways for Developing the Construction Facilities in Cities"]

[Text] With the transition to mass housing construction using industrial methods and standard designs, there has been a significant increase in the construction volume, construction times have been shortened and the proportional cost of erecting the housing has declined.

At present, along with a further increase in the volume of housing construction, there is the acute need of raising the architectural quality of development, and this consists primarily in extensive variability in the employed standard housing plans and the development of a full range of them by the housing construction enterprises.

A rise in the construction variability of urban development is related, as a rule, to the necessity of increasing the range of standard housing, and consequently, the range of products. Recently the introduction of the modular-section method of standard designing has contributed significantly to improving the architectural expressiveness of construction.

This is particularly felt in large cities where extensive construction facilities (the presence of several housing construction enterprises) has made it possible to change over to a broader range of housing (modular-sections) by carrying out internal plant and, partially, interplant specialization in producing the products. However, in a majority of cities which, as a rule, possess one housing construction enterprise, regardless of a certain improvement in the architectural qualities of development as a result of introducing the new standard housing, there has been a tendency for a decline in the volume of product produced by the housing construction enterprises. According to the data of the GlavNIIVTs [?Main Scientific

Research Institute for Computer Centers] of the Ukrainian Gosplan, the average annual capacity of construction industry enterprises has declined from 85.4 percent in 1975 to 82.9 percent in 1976.[1]

Thus, the changeover carried out everywhere in the republic to the modular-section method presupposes, as one of the conditions providing for production efficiency, either a significant increase in the existing capacity of the housing construction enterprises and which would make it possible to carry out internal plant specialization for producing the modular sections (or houses), or the carrying out of an organizational and technical unification (concentration) of the enterprises functioning in several nearby cities, for the purposes of carrying out interplant specialization and organizing the housing construction facilities along the lines of the territorial production complexes which have developed in other national economic sectors.

However, the organizational structure existing in the republic and the production facilities for housing and civil construction are not coordinated with the overall progressive trends in organizing material production, and these at the present stage provide a substantial benefit in the economy.

The changeover of civil housing construction to a broad industrial basis of fully prefabricated plant housing construction, a rise in the architectural quality of development on the basis of broadening the range of housing types with a maximum approximation to regional conditions and the use of the principles of the so-called open system of standardization, the concentration of housing construction for the population points with the carrying out of interplant specialization, and other tasks can be successfully carried out under the conditions of a systematic territorial organization of urban construction.

The high level of urbanization in the republic, the high density of the population points, the dense network of roads and railroads, as well as the demands of the concentration and specialization of industrial production for construction products for the purposes of improving its efficiency make it advisable to unify the facilities for housing and civil construction of the individual cities into organizational and technical systems for groups of interrelated settlements.

The formation of such groups of population points at present is also the basic direction for the planned transformation of settlement in the country as determined by the general and regional settlement plans. The regional settlement plan carried out by Kievniipgradostroitel'stva [?Kiev Scientific Research Institute for Urban Construction] together with Giprograd [?State Institute for the Designing of Cities] for the territory of the Ukraine[2] provides for the consecutive creation of group systems of population points in the republic and these would be formed on the basis of the developed center cities and agglomerations of settlements.

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[1] The period of transition to new housing series.

[2] The authors of the article are the persons responsible for the regional plan.

Within these systems for all the urban settlements, the volumes of housing construction have been estimated for the planned period (30 years), proceeding from the future size of the population and the forecasted level of available housing (23 m^2 of total area per person)[3] considering here the existing available housing and the housing to be liquidated because of decrepitness or out of design and planning considerations (reconstruction of the built-up area).

A comparison of the required volumes of housing construction over the long run and the expected volumes calculated from the extrapolation model indicates the necessity of carrying out a broad range of measures to intensity the development of the housing construction facilities in the republic.

This development can occur along two lines: either by a planned rise in the capacity of the building industry enterprises with the traditional production organizational system (relatively small housing construction combines producing, as a rule, the products for one type of building), or by the concentration of housing construction enterprises from several nearby population points (in a radius up to 50-60 km) into unified organizational technical production systems. The first method requires a great increase in the production areas and labor resources, providing limited opportunities for developing the necessary diversity of housing types according to the urban construction requirements. The second path makes it possible to reduce the proportional expenditures on the development of construction facilities by enlarging the enterprises as a result of production concentration and their thorough specialization. Here an urban construction effect should be obtained by broadening the total range of standardized products for a complete series of housing as employed in building up the entire group of towns unified by the common housing construction facilities.

In this instance the concept of a series is broadened to a range of apartment building (modular sections) which differ in terms of the number of stories and the architectural and urban construction purposes and are united along the design and production lines. Such comprehensive series comprise architectural, design and production systems which encompass extensive territories (zones) with definite engineering-construction, material-raw product, and other conditions.

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[3] Such a level of available housing over the long run is recommended by the Central Scientific Research Institute for the Economics and Planning of Housing and the Institute for Communal Hygiene imeni Sysin, proceeding from the conditions of the exponential growth of human needs and the determined hygienic optimum.

The groups of settlements unified by the common housing construction facilities can be isolated in construction regions where a definite volume of work in the area of housing and civil construction is concentrated within the common tasks of the urban development of the given territory. The basis for organizing the construction region is the group of housing construction enterprises unified by common tasks in providing the most efficient construction organization in economic, architectural and urban development terms.

As preliminary research has shown, the parameters of the construction regions which best satisfy the designated requirements should have the following values: total capacity of the housing construction enterprises operating in the region should be at least 300,000 m^2 of total area; the predominant service radiuses for the construction facilities of the region should be 50-60 km.

Individual large and very large cities with great volumes of housing construction where development is carried out by several housing construction enterprises, also figure as construction regions. An exception is made for those which on adjacent territories within a radius of 50-60 km do not have population points with an average annual volume of long-range large-panel housing construction from 300,000 m^2 of total area and more.

The center cities of the construction regions are determined from a number of conditions. They should be places where housing and civil construction is concentrated; they should have industrial housing construction facilities; as a rule they should be located in the planned center of the construction region (or in the area where the largest volume of housing and civil construction is carried out); they should have developed road (railroad) ties with the other settlements of the region in which housing and civil construction is to be carried out.

Proceeding from this, on the republic territory it is possible to isolate 73 construction regions, including those in the largest cities of Kiev, Khar'kov, Donetsk (together with Makeyevka), Dnepropetrovsk and Odessa.

The most progressive way for improving the organizational structure of housing and civil construction in the republic must be considered the unification of the construction regions into large regional zones. Within these zones there should operate construction and design associations based upon the territorial production-construction (urban construction) combines and large design institutes in the urban development area, with the creation of subdivisions for standard designing in them.

As a total for the republic, one can recommend the setting up of eight construction and design associations with headquarters in Kiev, Khar'kov, Donetsk, Dnepropetrovsk, Odessa, L'vov, Vinnitsa and Simferopol'.

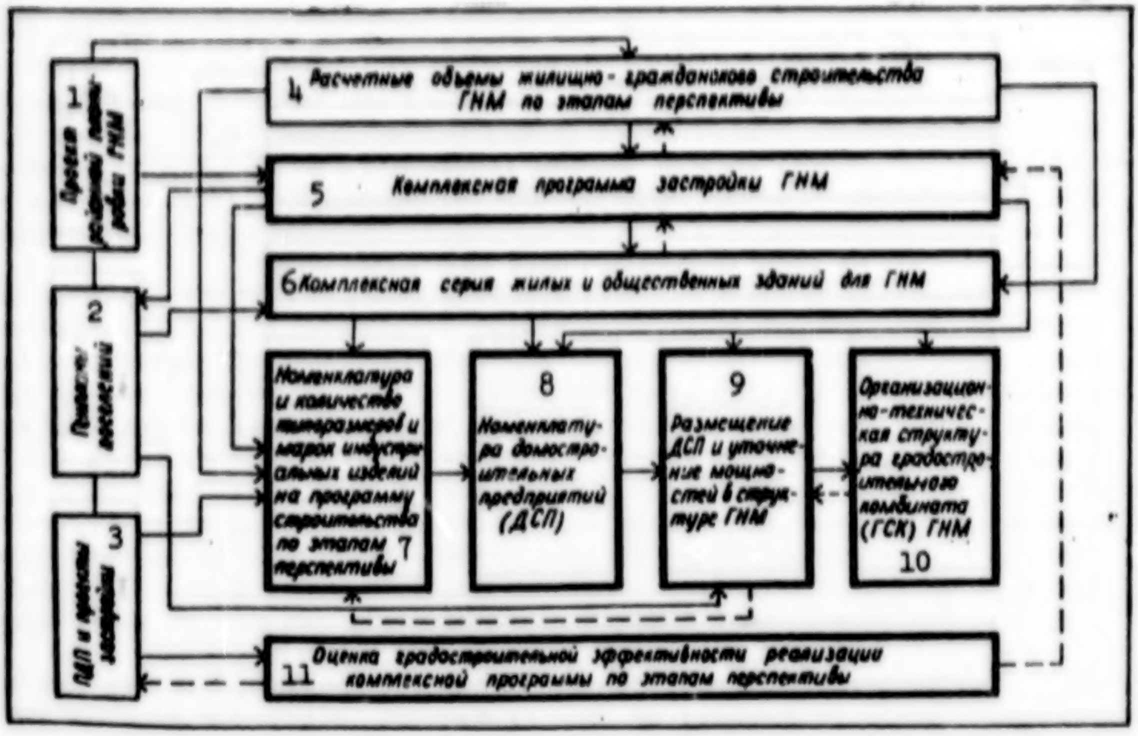
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Diagram for the organization of construction facilities for a group of population points (GNM).

Key: 1--Regional planning plans for the GNM; 2--General plans of settlement; 3--PDP [?housing development plans] and development plans; 4--Calculated volumes of housing and civil construction for GNM in terms of stages of the future period; 5--Comprehensive development plan for GNM; 6--Comprehensive series of housing and public buildings for GNM; 7--classification list and number of types, sizes and grades of industrially produced articles according to construction program by future stages; 8--classification list of housing construction enterprises (DSP); 9--Location of DSP and adjustment of capacity in structure of GNM; 10--Technical and organizational structure of housing construction combine (GSK) of GNM; 11--Evaluation of urban construction effectiveness of carrying out comprehensive program in terms of future stages.

The distinguishing feature of the construction and design associations from the current organization of construction and designing consists in the strengthening of territorial concentration, the creation of a strong industrial base for construction, the maximum adaptation of the design developments to the capabilities of the construction facilities, the elimination of small multifunctional primary construction organizations belonging to different departments, and the creation of large production sections under the unified leadership of the urban construction combines.

The construction and design associations should possess capabilities for the rational concentration of manpower, material and equipment. In addition to directing the carrying out of construction and design work, such associations would plan and forecast the development of the construction sector in the zone of its operations, as well as work out subseries of standard plans for housing and public buildings which would consider the specific construction conditions in the construction regions and zone, and so forth.

Production administrations which carry out housing and civil construction in their region should have a unified material and technical base and provide plant manufacturing of all structural elements, products, semifinished articles, and so forth.

The structure of the production administrations should include specialized construction and installation sections which would carry out work in the population points and at individual projects of the construction region.

For the purposes of a fundamental improvement in all levels of housing and civil construction in the republic--from designing to the completion of the projects--as well as all levels of the economic mechanism--from planning to the organization of construction management--it is essential to work out a specific comprehensive scientific and technical program which would outline the ways for gradually solving the problems posed in the article. Such an approach corresponds to the recently approved Decree of the CPSU Central Committee and USSR Council of Ministers "On Improving Planning and Strengthening the Effect of the Economic Mechanism on Raising Production Efficiency and Work Quality."

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Moscow Construction Conference

Moscow STROITEL'NAYA GAZETA in Russian 18 Jan 80 p 2

[Article by S. Rastorguyev from Moscow: "To Work Without Laggards"]

[Text] The Moscow city report and election conference was held for the trade union of workers in construction and the building materials industry. The accountability report was given by the chairman of the trade union gorkom N. Sotskov. In the report and speeches by the conference participants, particular attention was given to the questions of the development of the socialist competition and to a further rise in production efficiency and quality.

The last 4 years of the Tenth Five-Year Plan have been marked by the unstinting labor of the Moscow construction workers and the workers of the building materials industry. During this period, around 1.5 million m^2 of industrial area, 17.7 million m^2 of housing, 82 school buildings, children's preschool institutions for 70,000 places and many other projects, including a majority of the Olympic ones, have been built and put into operation.

These achievements are largely due to the socialist competition which has developed widely among the collectives. The mass introduction of such progressive initiatives as the brigade contract, the "Worker Relay," and "A Larger Volume with a Smaller Brigade" have helped to raise efficiency. An important effect has been achieved by the initiative of the collectives from the leading enterprises of Glavmospromstroymaterialov [?Main Moscow Administration for the Building Materials Industry] which have resolved to achieve the entire increase of the production volume in the five-year plan by a rise in labor productivity, by the better utilization of the labor resources and by the retaining of worker personnel.

For achieving the highest results in the all-Union socialist competition to raise work efficiency and quality over the 4 years of the Tenth Five-Year Plan, 49 collectives received the rotating Red Banners of the CPSU Central Committee, the USSR Council of Ministers, the AUCCTU and the Komsomol Central Committee.

At the same time, the conference participants, in analyzing what has been achieved, pointed out that the city committee and the site, plant and local trade union committees have still not seen to it that the socialist competition everywhere becomes an effective means both in solving economic problems and in the communist indoctrination of the workers. There are numerous shortcomings in this area in the following trusts: Mosstroy [Moscow Construction] No 29 and No 33, Mosfundamentstroy [Moscow Foundation Construction] No 5 and No 7, Mosprommontazh [Moscow Industrial Installation], the Kuybyshev Repair Construction Trust, and the plant for nonstandard equipment. It is no accident that these organizations have not met the plan quotas.

At a number of projects, rush work still continues to flourish. This is largely a consequence of miscalculations in planning and the supplying of the sites with materials and equipment. There have been serious shortcomings in production management.

In recent years in the Moscow glavk's [main administration or trust], serious organizational changes have been carried out. Large specialized associations have been set up. And this has born fruit. For example, the volume of construction and installation work carried out by the subdivisions of the State Construction and Installation Association No 1 has noticeably increased. However, serious shortcomings in planning impede a further rise in production efficiency. Calculations have shown that their must be an entire five-year plan to end the just commenced construction projects. In this situation, virtually no work is being done on a number of associations included in the plan, millions in state funds are being frozen, and the amount of uninstalled equipment--including imported--is growing.

The shortcomings in planning and the violating of economic accountability principles lead not only to serious economic losses, but are also reflected in the indoctrinational work. The conference participants emphasized the importance of the Decree of the CPSU Central Committee and USSR Council of

Ministers "On Improving Planning and Strengthening the Effect of the Economic Mechanism on Raising Production Efficiency and Work Quality." The realization of this decree will make it possible to significantly raise the construction pace.

However, at times the leaders of the organizations and enterprises and the trade union committees endeavor to conceal their own serious failings in the organization of labor, the everyday life and rest of the workers and in indoctrinational work by supposedly objective factors. As before there is still a very great number of infractions of labor and production discipline, there have been numerous absences without leave, tardiness, and showing up for work in an inebriated state.

And in a number of organizations there has been a tolerant attitude toward this. And they endeavor to compensate for the losses by the unjustified involvement of the workers in overtime and holiday work, in flagrantly violating the labor legislation. The Decree of the CPSU Central Committee, the USSR Council of Minsters and the AUCCTU "On Further Strengthening Labor Discipline and Reducing Personnel Turnover in the National Economy" has outlined a range of measures to eradicate these negative phenomena.

It is essential to actively generalize and disseminate the experience of the best enterprises and organizations such as the Karacharovskiy Machinery Plant, the DOK [woodworking combine] No 9, the Mosremstroymash [Moscow Construction Machinery Repair] Association, and the Scientific Research Institute for Foundations and Underground Structures which have won the title "Model Enterprise of the City of Moscow."

Unfortunately, a number of trade union committees is giving clearly insufficient attention to these questions.

Having thoroughly disclosed the shortcomings, the participants of the report and election conference approved a decree which outlined a range of measures to further develop the socialist competition, and to raise production efficiency and work quality in order to properly celebrate the 110th anniversary of the birthday of V. I. Lenin, and to successfully complete the quotas of the Tenth Five-Year Plan.

The conference named the new membership of the trade union gorkom. N. Sotskov was again elected its chairman.

Urban Planning in Ivanovo

Moscow STROITEL'NAYA GAZETA in Russian 12 Dec 79 p 3

[Article by A. Gravel'nikov, special correspondent in the city of Ivanovo: "No Claim to Comfort"]

[Text] "Our city is a workers city, without any pretensions," I was told by the chairman of the Ivanovo City Executive Committee, L. Kruglov, in our first meeting. By this he meant that Ivanovo, in contrast to other centers, was not attempting to amaze anyone by the unusualness of its districts, and was not claiming the role of an innovator in urban development.

In actuality, the city's microrayons built basically in the old series of five- and nine-story buildings look grey and cheerless. The local housing construction combine which several years ago was to convert to producing housing of the modern "90" series, although reconstruction has still not been completed.

The situation is aggravated by the fact that each client (and there are 126 of them in the city) endeavors to build more housing with its slim funds. Such clients are least of all interested in the external appearance of the building and how it would look together with the others. They want square meters....

"In each building put up, you can see the physionomy of its client," sadly joked the director of Ivanovgrazhdanproyekt [Ivanovo Institute for Civil Design], A. Medvign, when our conversation got around to the comprehensive development of the city.

Can the capital construction department of the city executive committee carry out an urban development policy if it controls only 27 percent of the capital investments? (We might point out that this is one of the lowest figures in all the RSFSR.) Actually the OKS [capital construction department] is not the boss of development in the city. In beginning construction of a certain microrayon, it is unable to finance the entire volume of work and, in feeling its impotence, is forced to turn over a portion of construction to various departments and organizations. Thus the microrayon loses its integrity and becomes a group of individually standing buildings.

Moreover, the scattering of funds often leads to delays in the construction time. An example of this is microrayon "D" in the southern part of the city, where among the builders are small textile mills who finance housing construction in small doses. As a result, the microrayon has been under construction for almost 15 years.

Concerned only with obtaining square meters of housing, numerous clients often neglect the construction of cultural, service and utility facilities, hoping that someone else will supply the money.

The residents of the new rayons located far from the municipal mainlines are in a particularly difficult situation due to such incomplete development. Thus, in the microrayon of the TETs-3 which is being built by the construction administration of this enterprise, there is only one crowded small store where they sell everything from bread to vegetables, as well as a children's center. They are just now preparing to build a school. And the first residents have already been here for several years.

But to all these misfortunes one must add another. The numerous small clients do not make it possible for the construction workers to create a viable backlog for the following year, or to carry out planned preparations on the territories of new mass development.

In Ivanovo, there has long been the necessity of setting up the service of a single client, due to which it would be possible to organize comprehensive and continuous planning of assembly-line construction of housing, cultural, service and communal utility facilities. The experience of the originator of this method, Orel and certain other cities, shows that the construction times of the projects are reduced by almost 1.5-fold, and the total savings of capital investments with the comprehensive development of the cities reaches 8-15 percent.

However, the Ivanovo workers are in no hurry to organize assembly-line construction. The leaders of the city executive committee appear not to be against the service of the single client. There are even the plans for such a reorganization. At the same time, the practical solution to this question is put off under all sorts of pretexts. Fears are voiced that the industrial enterprises may completely cease to help the city in its needs. They also complain over the small staffs of the OKS and refer to the absence of its own facilities.

"The Ivanovo workers are ailing from the illness which has already been cured in the other cities," was the opinion of the chief specialist of the Department for the Organization, Economics and Mechanization of Construction of the RSFSR Gosstroy, V. Sanin. "In order to assume the role of the single client, the OKS does not necessarily have to create its own facilities. The simpler and better way would be to utilize what already exists. For example, the Tul'skaya Oblast Executive Committee has organized the deliveries of the client through the facilities of the RSFSR Gossnab.

An effective way has also been found to involve the enterprises in the development of the municipal economy. In the city of Engel's, this has been done using a volunteer coordinating council of enterprise directors under the city executive committee. This council has provided very substantial aid to the city in public amenities, and in repairing and building educational and public health facilities, cultural, service, trade and utility institutions.

But in Ivanovo, initiative and tenacity have not been shown in solving the vitally important question for the development of the city. Here at present, for example, great hopes are placed on building the new Sukhovo-Deryabikhskiy residential district designed for 60,000 inhabitants and consisting of three microrayons. In the opinion of the chief city architect Ye. Kasatkin, this can become a model. The local architects and designers have provided a maximum of conveniences for its future residents.

"In order to achieve comprehensive development and avoid the departmental separateness, here the OKS will control all the capital investments," Ye. Kasatkin assured us.

However the chairman of the city planning commission, M. Bochkov, did not share the optimism of the chief architect. And, unfortunately, his viewpoint, in our mind, more realistically reflects the actual state of affairs.

"The OKS cannot hold all the funds for building the new residential district," said M. Bochkov, "because it has many commenced projects in other rayons of the city. Hence, other clients must be brought in, and under these conditions the rayon will not be built, as they say, in a single breath...."

A worker city should acquire a modern vivid and expressive appearance. One of the effective ways for solving this problem is the comprehensive development of the microrayons. This should become the concern of not only the local leadership, but also of all the ministries whose enterprises are located in Ivanovo.

Plans for Omsk

Moscow STROITEL'NAYA GAZETA in Russian 20 Jan 80 p 3

[Article by V. Ovchinnikov: "How Omsk is To Be"]

> [Text] The new correspondent of STROITEL'NAYA GAZETA for Omskaya, Novosibirskaya and Pavlodarskaya oblasts, V. Ovchinnikov, has begun his work. We are publishing his first article from Omsk.

Have you ever been in Omsk? If so, then probably it would not hurt to ascertain whether this was a long time ago or not. Otherwise it may happen that your impressions are out of date.

In recent years, the shore of the Irtysh by the city has changed beyond recognition. Some 20 years ago, it was abandoned land, swamps, and open spaces where the spring floods ruled. At present, on this site there is a 5-kilometer quay populated by nine-story apartment buildings and beautifully equipped beaches.

"The improvement on the right bank has turned the city toward the river," said the deputy chairman of the city executive committee N. Gritsevich. "In order to carry out this most important urban development problem, around 5 million tons of sand had to be built up, and involved work carried out to strengthen the banks."

In recent years, 12-story buildings have risen on the central streets. Magnificent buildings have been put up for a concert hall, a music hall, a TYuZ [Youth Theater], an actor's club, and a high-rise hotel. A trade center and an ice [sports] palace are being built. A Pioneer Palace has been located in a pine grove and this has a swimming pool, an observatory and a children's theater. Over the 4 years of the five-year plan, in the oblast center around 2 million m^2 of housing have been built along with scores of new schools, nurseries, hospitals and polyclinics, and more than 300 service-sphere enterprises.

In the middle of the 19th century, F. M. Dostoyevskiy, who spent 4 long years in the fortress here, wrote: "Omsk is a nasty little town. There are almost no trees...I did not see nature." At present Omsk is one of the greenest cities of Russia. The parks, squares and boulevards are an inseparable feature of its appearance. On the left bank the people of Omsk have grown birch, pine and aspen groves and have built picturesque lakes.

The recently approved decree of the USSR Council of Ministers on measures relating to the further development of the Omsk municipal economy in 1981-1985 has been a new manifestation of the party and government concern for improving the social and domestic conditions for the people of Omsk. This is a full-scale program for the social development of the city which provides for the solving of major urban development problems. There are plans to build new power capacity and the power transmission line between Ekibastuz and Omsk, large thermal networks, and a gas line from the Western Siberian deposits. Another bridge will connect the banks of the Irtysh. In the following five-year plan, the technical and economic background studies will be worked out for building the first stage of a subway in the city. For protecting the environment, a number of industrial enterprises will be moved outside the city limits. A new airport is to be built.

"Recently the USSR Gosstroy summed up the results of a competition for the best architectural layout and spatial plan for the center of Omsk," said the chief city architect A. Karimot. "The plans which were given first prizes provide for three zones: administrative-business, theater-amusement and a recreational zone with large sports facilities."

In the decree particular attention is given to the further development of mass housing development in the new rayons and above all on the Left Bank. Of the 2.5 million m^2 of housing which are to be put up in the following five-year plan, a large portion will be built precisely here. The city has boldly moved across the river. Residential districts, stores, schools, nurseries and polyclinics have risen here among the birch groves which have been untouched by construction workers. Here already around 100,000 persons live. By the year 2000, this figure will increase by 5-fold.

Such major changes have required intense work from the executive committee of the city soviet as well as the construction and design organizations. The new microrayons require comprehensive development and architectural attractiveness. Here the monotonous rectangles of the obsolete "335" series still predominate. There still are not enough nine-story buildings of the "90" series.

"The construction industry facilities lag behind the rapid development of the city," said the chief engineer of Omskgrazhdanproyekt [?Omsk Civil Planning Institute], P. Savostikov. "And we, in designing the housing, had to adapt to the existing capacity which was organized only to turn out 'representative houses.' In the development of the microrayons we were forced to leave room for buildings which had turning, angular or other modular sections. We completed the designing of eight such modular sections of the 111-90 series at the end of last year. The large-panel housing construction trust of Glavomskpromstroy [Main Omsk Industrial Construction Administration] will begin producing them soon."

The decree of the USSR Council of Ministers envisages that a new housing construction combine will go into operation with a capacity of 140,000 m^2 of total housing area per year. At present one of the plants of the glavk is being reconstructed to convert to the production of progressive series housing. All of this will make it possible for the people of Omsk in the next few years to improve the quality, achieve a diversity in the development of the new rayons, and raise the number of stories.

But in order to achieve this, many difficulties must be overcome. For example, those involving the delivery of building materials. Virtually all of them including lumber, cement, sand, clay and gravel are hauled in from afar, and this leads to greater construction costs.

"Due to transport costs, crushed rock, the wholesale price of which is around 4 rubles per ton, costs us almost 3-fold more," said the deputy chief of Glavomskpromstroy, N. Timofeyev. "And this is the case literally with all materials. And under Siberian conditions, we need more of them than usual."

The leaders of many local industrial enterprises must change their attitude toward the city's needs, as they take a rather meager proportional part in the construction of housing.

In considering that a large portion of construction in the oblast was carried out by the USSR Ministry of Industrial Construction, the people of Omsk are hopeful that the ministry will endeavor to promptly finance all the measures needed for the development of the city, and ensure their fulfillment by the forces of Glavomskpromstroy.

Both the designers, the construction workers and the workers of the city executive committee feel that it is time to work out an urban development contract in Omsk. And it is also essential to see to it that a standard microrayon is submitted to the USSR Ministry of Construction for approval, and this would become a sort of "testing range" for working out the forms of collaboration among all the parties involved in construction. This will help to successfully develop the new series, and to transform the appearance of new rayons of the city on a high aesthetic level.

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CAPITAL CONSTRUCTION IN LENINGRAD PROCEEDING APACE

Leningrad STROITEL'STVO I ARKHITEKTURA LENINGRADA in Russian No 1, 1980 pp 2-5

/Article by V. S. Kulibanov, Director of the Northwest Branch of the TsENII (Central Economic and Scientific Research Institute) under RSFSR Gosplan, Candidate in Economic Sciences: "Provide a Scientific Basis for Planning: Methods of Improving the Efficiency of Capital Construction"/

/Text/ Over the extent of the entire history of our state the Communist Party and the Soviet government have paid and are paying constant attention to capital construction, the growth of its volumes and rates, to increasing efficiency, to the growth of productivity and improving the organization of labor, as well as to improve the forms and methods of supervision and administration. Huge sums have been and are being directed into the construction sector of the national economy. Earmarked for its development during the last two five-year plans alone were more than 35 billion rubles of capital investments.

Construction production is being developed at a rapid and constantly accelerating rate in Leningrad and Leningrad Oblast--an important link in the country's integrated national economic complex. During the last few years the Leningrad region's construction potential has increased six-fold, while the volume of capital investments which have been assimilated during the current five-year plan has reached 12 billion rubles.

In the past year there were in this city and oblast more than 650 independent construction organizations, whose equipment included more than 2200 excavators, 2500 bulldozers, almost 3000 portable cranes, and a great deal of other machinery. The supply of Leningrad's construction projects with the means of mechanization during the last two five-year plans alone has doubled, labor productivity has increased by more than 40 percent, and the number of workers per 1 million rubles of construction and installation operations has been reduced by more than 35 percent. This has allowed us, while carrying out the 1978 program, to guarantee real savings in labor outlays equal to a reduction in force of 47,000 persons.

Speaking at the November 1979 Plenary Session, the General Secretary of the CPSU Central Committee and Chairman of the Presidium of the USSR Supreme Soviet, Comrade L. I. Brezhnev, stated that every year more than one-fifth of the national income is spent on capital construction. We are building a great deal, but the construction time periods are often drawn out. Such a situation cannot be satisfactory to us.

In implementing the Party's decisions, the Leningrad Oblast and City CPSU Committees have done quite a bit to ensure than the 300,000-person army of Leningrad builders attain sufficiently tangible results by means of a more rational and effective utilization of fixed production capital assets.

In Leningrad and in Leningrad Oblast, as was stated at the Second Session of the USSR Supreme Soviet, there has been a doubling of the means allocated to each construction project, while, at the same time, the number of projects being erected has been reduced by one-fourth. Leningraders have been credited with many valuable and progressive innovations; they have traditionally been in the forefront of socialist competitions for speeding up the rate of construction production, increasing its efficiency, and improving its quality. A fine start for the culminating year of the five-year plan has been provided by the mass labor work shift in honor of the 110th Anniversary of V. I. Lenin's birth.

But, in accordance with the Leninist heritage, we must not speak only about achievements. The growing scope of the development of Leningrad's economy poses for the builders newer and newer tasks, sometimes even more complex and responsible than previous ones.

One of the most important and urgent problems is the sharp acceleration in the growth of capacities on the part of the entire construction industry. During recent times, especially during the 10th Five-Year Plan, the existing contracting organizations and enterprises in the building-materials industry have turned out to be incapable of guaranteeing the necessary development rate of the leading sectors of the national economy in Leningrad and Leningrad Oblast.

The situation is aggravated by the fact that the increase in the volumes of construction production during the 10th Five-Year Plan has been carried out more slowly than it was in the 9th Five-Year Plan. If during the period 1971--1975 the volume of construction and installation operations increased by 31 percent, then during the following years such growth amounted to only about 6 percent, while the capacities of several large organizations have remained on the same level as at the end of the previous five-year plan. As a result, the tasks for 1976, 1977, and 1978 with regard to the introduction of fixed assets were not fulfilled, and incomplete construction also increased.

But what were the principal reasons for these negative phenomena, which are still to be observed in capital construction? There are many of them. Some are dependent, while others are not directly dependent, on the construction organizations. Most of them have been discussed on more than one occasion in the pages of the Leningrad press, including the journal STROITEL'STVO I ARKHITEKTURA LENINGRADA.

This consists, primarily, of an insufficient stability of the five-year and even the yearly plans for capital construction, as well as their frequent adjustments with regard to total volume as well as to structure. We must note the poor coordination of the yearly plans with the five-year plans, as a result of which there are frequently substantial changes in the address program, and, therefore, insufficient use is made of the inventories of construction under way and the design-estimate documents which have been worked out.

Secondly, this is due to an insufficient interrelationship between the plans for capital construction and its material and technical supply support; at times there are even disruptions of the agreed-upon schedules for delivery of needed construction components and items, machinery and mechanisms, and technological equipment. The growth rate for volumes of operations being carried out is not balanced with the potentials and prospects for the development of enterprises in the building-materials industry.

And, in the third place, there are substantial shortcomings in the utilization of fixed production capital, primarily, of its active component. This is testified to by the following facts: the capital-labor ratio of builders during the 9th and 10th Five-Year Plans more than doubled, while labor productivity increased by only 40 percent.

In analysing the potentials of Leningrad's leading construction main administrations, the staff members of our institute established, for example, a persistent tendency to reduce the rate of construction equipment replacement. If in 1970 the rate of such replacement amounted to more than 10 percent, in 1975 it was only about 7 percent in all, and in 1977--only slightly more than 6 percent. Frequently, machinery and mechanisms which are practically inoperative are not written off but rather continue to be listed among those which are still functioning. Naturally, such equipment, which does not provide the planned yield in the process of operation, requires supplemental expenditures to service it.

But what is the actual amount of such obsolete equipment?

Calculations show that at present in our area it comprises approximately half of the total amount of fixed capital for construction purposes, or almost 40 percent higher than the average indicator throughout the Russian Federation. As a result, the work of skilled machine operators is becoming less efficient, while the use of equipment is at the level of the beginning of the last five-year plan. With respect to time, the existing machinery is operating at a level of 7--10 percent less than the norm. Just bringing this indicator up to the normative level would permit an increase in the volume of operations carried out annually in the Main Leningrad

Construction Administration by two million rubles, and in the Main Western Construction Administration--by almost four million rubles.

Among the principal shortcomings we must also refer to those such as the retention of a large quantity of manual operations and the insufficiency of the small-scale mechanization. Continuing to occur is a high turnover rate among personnel, significant losses connected with unsatisfactory cultural and everyday conditions at the construction sites, as well as with the nonobservance of the requirements of labor safety and industrial sanitation, along with a low level of production discipline.

Finally, we must admit that production efficiency is also being adversely affected by the slowed-down rate of intended organizational transformations and of the rationalization of administrative forms and methods. The weak development of low-level cost accounting has also had an effect.

It would be possible to cite an entire series of further reasons, but those already mentioned are fully sufficient to outline a circle of problems requiring that steady attention be paid to them. Let's dwell primarily on those for which concrete methods of solution in principle have already been outlined.

The recent decree of the CPSU Central Committee and the USSR Council of Ministers, "On Improving Planning and Strengthening the Influence of the Economic Mechanism on Improving Production Efficiency and Work Quality," pointed to the necessity for achieving maximum plan stability. In order to do this, they must be drawn up with consideration being given to the comprehensive solving of the problems of economic and social development by the ministries, associations, and enterprises for the rather distant future.

It is necessary to provide not only for the coordination of limits between state capital investments and the volumes of construction and installation operations but also to ensure the implementation of fixed capital assets and production facilities, including the growth of capacities by means of the technical retooling and modernization of existing facilities, along with the allocation of expenditures precisely for these purposes.

Such an approach certainly poses problems which are not only, to the highest degree, urgent but which are also quite complex. Before determining, for example, the growth of capacities by means of a technical retooling and modernization of production facilities there must be a disclosure of the imminent changes and a calculation of the necessary requirements for capital investments and equipment. The creation of precisely such plans by the ministries and departments, as well as by the Union republic Councils of Ministers is the particular target of the degree of the Party and the government. It is completely obvious that the effectiveness of their implementation is directly dependent on the level of the scientific grounds and on the ability to forecast the principal trends of scientific and technical progress not only in our own but also in closely related sectors of the national economy. This is why future planning for economic and social development must begin with the working out of a comprehensive NTP (Scientific and Technical Progress) program for 20 years with a detailed breakdown by five-year periods.

It should be noted that we are now approaching the completion of drawing up the program for scientific and technical progress and its socioeconomic consequences until the year 2000 for the country as a whole. Making it more precise, adjusting and making it more specific, will, naturally, be continued constantly and uninterruptedly. But regarding the regional comprehensive NTP programs, here the matter is somewhat more complex.

Important constituent elements of the comprehensive plan for scientific and technical progress must be the solutions to socioeconomic problems which proceed from the characteristics of Leningrad and Leningrad Oblast. They include individual sectors of industry and agriculture, the material base of higher educational institutions, systems of children's preschool institutions, vocational-technical training, and other problems.

In order to implement all this, independent comprehensive target programs have been formulated. As an example we may cite the plan for developing the oblast's agriculture during the 10th Five-Year Plan; its implementation allowed us to achieve notable successes in the production as well as in the non-production spheres. There is also a similar plan for the 11th Five-Year Plan.

Nevertheless, the formulation of each trend of the comprehensive target program is being retarded by the insufficient development of methods. A no less substantial problem is the lack of a single client and user of such developments on a regional scale.

The imperfection of the methods support, as the practical experience of the last few years has shown, hinders the disclosure of the entire aggregate of problems which require solution within the framework of the target program. The specialists of our branch are now engaged precisely in working out precisely this problem, since a lack of well-thought-out methods inevitably leads to a multiplicity of organizational and technological schemes, which are not always put together with sufficient competence. Only a single client would be able to ensure a high quality in the latter and to establish a constant control over the process of implementing the target programs.

It would be utterly natural if the planning commissions of the Leningrad Oblast and City Ispolkoms were to act in the role of such a client.

We can confidently assert that everything mentioned above regarding target comprehensive regional programs of other sectors of the economy also holds true, to the fullest extent, with regard to construction on the scale of the entire region as well as in each large construction and installation organization. Analysis of the activities of Leningrad's Main Administrations has shown that many shortcomings are closely linked with an inability to make a good-quality utilization in practice of program-target methods in solving important and quite complex problems.

Last year the Institute of Socioeconomic Problems of the USSR Academy of Sciences, our branch of the TsENII under RSFSR Gosplan, in conjunction with the Planning Commission of the Lengorsovet Ispolkom, the principal sectorial and departmental organizations, as well as the specialists from a number of scientific research institutes and higher educational institutions made an attempt to formulate a variant of the comprehensive program for scientific and technical progress and its socioeconomic consequences until the year 2000 for Leningrad and Leningrad Oblast. However, it is impossible to say that as of now its content is fully adequate for formulating the chief developmental trends for the economy of our city and oblast. Quests are continuing for not only specific individual solutions but also for a number of important general theoretical and methodological positions.

As determined by the decree of the CPSU Central Committee and the USSR Council of Ministers, the developmental plans for five and ten years must be worked out, proceeding not only from the comprehensive NTP program but also, in the first place, from the general socioeconomic tasks which have been set by the Party for the long-term future of the country as a whole and its individual regions. In order to efficiently combine sectorial and territorial interests, we need to take into consideration additional conditions as well.

As experience has shown in working out a comprehensive plan of economic and social development for Leningrad and Leningrad Oblast for the years 1976--1980, the formulation of the principal trends of development up to 1990 and the draft plan for the 11th Five-Year Plan, along with the grounds for such documents, may be supported only in the presence of clear-cut prospects for the development not only of each of the sectors of the Leningrad national economic complex but also of their reciprocal ties and interdependence. The specifics of the development of the economy of Leningrad and Leningrad Oblast are determined by their significance in the All-Union division of labor, specialization of the leading sectors of industry, and the contribution of Leningrad's science to the country's national economy.

Local potentials for speeding up the development rate of the economy depend primarily on the presence of manpower, territories for situating new enterprises, and a guaranteed supply of natural resources, which, to a large extent, influences the selection of the most efficient variants of the balanced plans. Substantial attention herein is being paid to the solution of economic and social problems, to environmental protection. At the same time, we must take into consideration the potential effect which is contained in optimizing cooperation among the complex's enterprises, developing their specialization, and improving the systems for administering the associations' economy and production structure.

Such a complex problem cannot be solved with the aid of traditional methods. This is why one of the main trends in the acitivities of our institute, as well as several other research organisations, has become the quest for the possibilities to make a more extensive utilisation of mathematical-economic methods and up-to-date computer equipment. The creation on this base of a system of algorithmic models will allow us to thoroughly consider within a brief time period the different variants of the draft plan for a given period, both for the sector taken individually as well as for the national-economic complex as a whole. The first results obtained are already being applied in practice.

However, even the most progressive methods of calculation and modern equipment cannot by themselves ensure the stability of the plan, if the latter is not balanced with the genuine potentials of the construction organisations. This is precisely why the need for close coordination of the five-year plans for capital construction (specified year by year) with the availability of materials, engineering and power equipment, with labor and financial resources, as well as capacities of the construction and installation organisations, was particularly emphasised in the decree of the CPSU Central Committee and the USSR Council of Ministers.

Obviously, in formulating the corresponding sections of the comprehensive plan for the economic and social development of Leningrad and Leningrad Oblast, we must consider that the points of departure have become the precisely balanced volumes of capital investments and construction-installation operations, the assimilation of which assures the assigned developmental rate of the Leningrad economy. The attainment of just such a goal must determine the development of the capacities of the construction organisations as well as those of the building-materials industry.

But what are the ways to further develop the potential of the entire construction industry complex? There are many such ways, but the main one is the growth of labor productivity, based on the widespread introduction of the advanced achievements of science and technology, along with improvements in labor organization and administration. It is not in vain that the indicators of the level of labor productivity, the number of workers and office employees, and the total wage fund, in accordance with the decree must be asserted in the plans of the ministries and departments having construction and installation organizations, as well as in the plans of these organizations themselves, beginning already with the 11th Five-Year Plan.

What enormous reserves are inherent in correct labor organisation at construction projects is stated by the figures which the staff members of our branch have obtained. Approximately 60 million rubles a year for the Main Leningrad Construction Administration and more than 100 million rubles a year for the Main Western Construction Administration--such are the potentials for developing construction capacities merely by means of a qualitative improvement in brigade contracting and, linked with this, improvements in the forms and methods of supervising production, including the introduction of thorough cost accounting and sectional contracting.

Of particular importance at the present time is the further improvement of the organizational structure. The experience of Leningrad's industry, and of the progressive construction groups has convincingly proved the high degree of effectiveness of a specialization of enterprises and their cooperation, the consolidation of subdivisions of the basic unit of the administrative system, the creation of associations, and the curtailment, on this basis, of the step-type quality in the hierarchy of production supervision. The transition during the years 1979--1981 to an administrative system of no more than a two-or-three-unit administrative system in construction, the adoption of production construction-and-assembly associations as the basic cost-accounting unit, and, in individual instances--trusts--have also been provided for by the decree of the Party and the government.

The analysis conducted by our specialists shows that with a further concentration of construction production there is an increase in its effectiveness--there is a lowering of production cost, a growth in labor productivity, an increase in the profitability of work by organizations, and so forth. To be sure, there are marginal limits for the consolidation of construction subdivisions; these have been revealed by special studies.*

The enormous reserves which are inherent in the improvement of construction administration have been pointed out by the Bureau of the Leningrad CPSU Obkom, which examined these questions last year. The need to curtail the number of units and to consolidate construction subdivisions, as well as to improve the entire construction system, was noted by the Plenary Session of the Party Obkom which was held in October 1979.

There has also been an immeasurable growth in the urgency of improving the production administration in the sphere of agricultural construction within the oblast. In the light of the tasks assigned to Leningraders for the coming five-year plan, we must assimilate capital investments in an unprecedented volume--about two billion rubles.

In his report at the meeting of the activists of the Leningrad Party organization in September 1979 G. V. Romanov, member of the Politburo of the CPSU Central Committee, First Secretary of the Leningrad CPSU Obkom, emphasized particularly that the fundamental program documents which are the decree of the CPSU Central Committee on further improving the economic mechanism as well as the problems of the Party and government bodies and the decree of the CPSU Central Committee and the USSR Council of Ministers "On Improving Planning and Strengthening the Influence of the Economic Mechanism on Increasing Production Efficiency and Work Quality," to the fullest extent, reflects the consistency of the Party's economic policy, and it corresponds to the resolutions of the 25th Congress and subsequent Plenary Sessions of the CPSU Central Committee, the statutes of the USSR Constitution, and the directives of Comrade L. I. Brezhnev. They aim all administrative activity, including that in the field of construction, at achieving high end results for the national economy, as well as at more fully satisfying the growing needs of the workers. The strict observance of the statutes of the above-mentioned Party and government documents is a matter of honor for every Leningrader.

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* See Kudasov, V. I., Ber, A. Ye., Dubrovin, V. P., "Kontsentratsiya sil i resursov" /Concentration of Forces and Resources/, STROITEL'STVO I ARKHITEKTURA LENINGRADA, 1979, No. 12, p 6.

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CONSTRUCTION

LENINGRAD'S FACILITIES READIED FOR OLYMPICS

Leningrad STROITEL'STVO I ARKHITEKTURA LENINGRADA in Russian No 1, 1980
pp 31-32

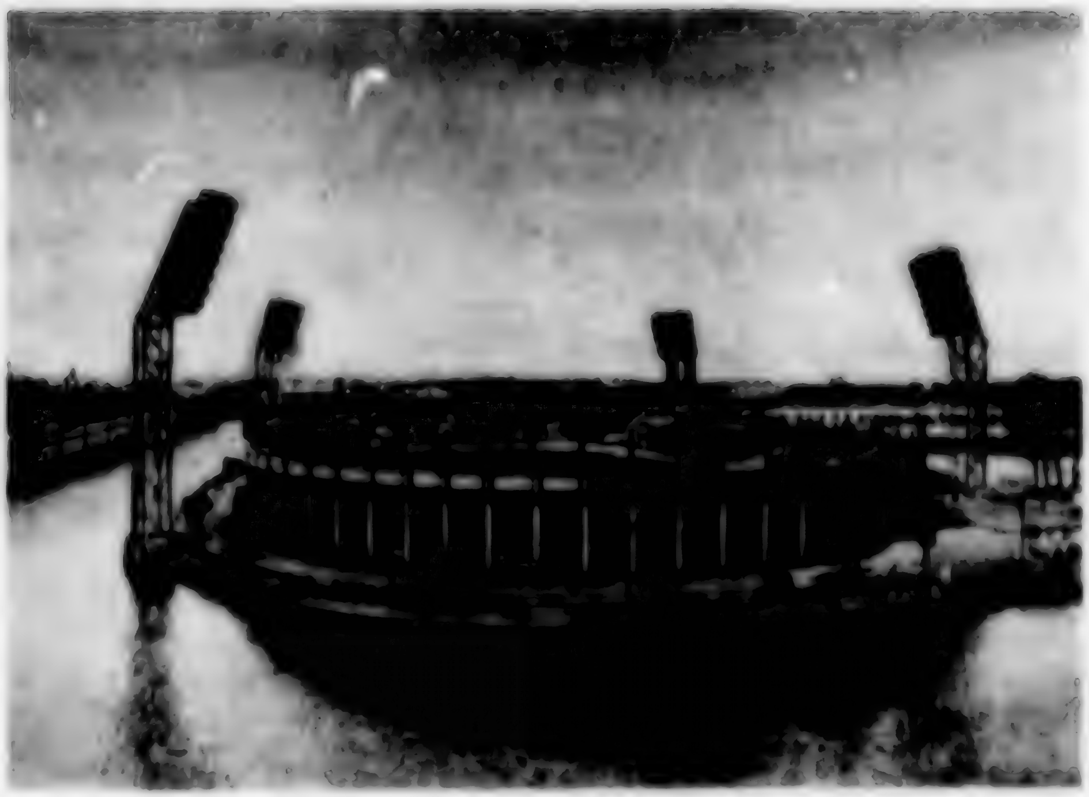
/Article: "Entering Upon the Olympic Year 1980"/

/Text/ Less than six months remain before the opening of the regularly scheduled Olympic Games. This time, as a sign of the recognition of the outstanding achievements of Soviet athletes in the international arena, the Games will be held in the USSR. Active preparations are being made in Moscow, Kiev, Minsk, and Tallin to meet and welcome the participants in this international sports forum, which will become a bright demonstration of good will and peaceful cooperation among the peoples of all countries.

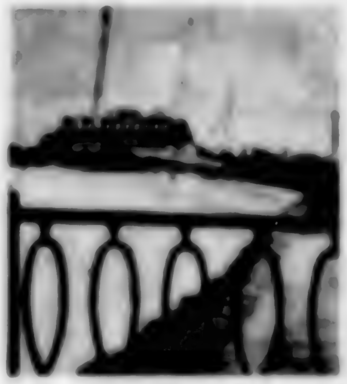
A large program of constructive works for the 1980 Olympics, representing a component of the comprehensive plan for the economic and social development of Leningrad and Leningrad Oblast for the 10th Five-Year Plan, is being carried out in our city; here, as is known, will be held the games of one of the group soccer tournaments, along with one quarter-final. The results of this past year testify to the fact that under the supervision of the Leningrad Party organization this program, involving all sectors of the city's economy, industry, transport, and service fields, is being implemented successfully on the whole.

The soccer games will be held at the S. M. Kirov Stadium; for reasons which are completely understandable, its modernization has been accorded top priority. The basic work on the city's main Olympic project, situated in the Maritime Victory Park, has already been completed. The innovations strike your eye immediately. And, first of all, are the four eighty-meter electric lighting towers. The 584 spotlights mounted on them will provide the proper conditions for color television broadcasting in the evening. The powerful sources of artificial light, when perceived from a remote distance, especially at dusk, will present an enchanting, fairy-tale spectacle to the gaze of the hundreds of tourists who will be arriving in Leningrad by the maritime route. The spectators will undoubtedly turn their attention to the elegant office pavilions located near the street-car circle and the main entrance.

Also impressive are the changes in the stadium itself. The soccer field has been completely modernized; its green turf now meets the international-class requirements. It is framed by the brick-red ribbon of the running track



After its modernization the V. I. Lenin Stadium has been accepted for operation with an evaluation of "fine."



Existing DSO "Trud" Yacht Club and "Dinamo" Rowing Base commissioned and put into operation.

with its precise white bands of markings. The quality of the synthetic "novotan" surface covering has been highly praised by the authoritative commission of the city sports committee. Hungarian specialists have installed electronic equipment on the two, redesigned scoreboards. The renovated stands can now accommodate 72,000 spectators.

Within each of the four sections located to the right and left of the central stands everything looks different. The press-center areas have been finished off very nicely; the dressing-rooms, rooms for resting, saunas, and shower-rooms; the medical-first-aid center is supplied with up-to-date equipment. In a word, the designers, clients, and builders took great care to create comfortable conditions for the athletes, officials, team representatives, and accredited journalists, as well as for radio and television commentators.

To be sure, there are still problems for the stadium directors. LenNIIproyekt (Leningrad Scientific Research Planning Office) was, unfortunately, late in preparing the technical specifications for the electric power supply to the commercial points. Work has been delayed on additional landscaping and beautification of the adjacent area, as well as on making the final adjustments and starting up the engineering equipment. There is not too much time left prior to the opening of the 22nd Olympic Games. Therefore, it is necessary to eliminate the unfinished business which we still have without delay. For as early as April the readiness of the S. M. Kirov Stadium for conducting a soccer tournament will be evaluated by a special commission of the IOC (International Olympic Committee).

Other important Olympic projects have not been neglected either. The participants in the soccer tournament must be assured of a good training base. For this purpose the city's other very large stadium--the V. I. Lenin Stadium--has been designated. Considerable capital repairs were made on it. These affected the turf on the soccer field, the electric lighting, and the auxiliary areas, which now have not only showers but also showers and pools.

At the present time an all-purpose sports hall is being introduced with stands having a capacity of 25,000 persons. This is the largest sports facility in our country and was built near the Moscow Victory Park. Its artificially surfaced soccer field has the standard dimensions and, in case of bad weather, it can be successfully used to carry out training practice; by the way, this can also be done in the Palace of Sports Games on Butlerov Street.

Physical education has always occupied an important place in the lives of Leningraders. It is not by chance that our city has 70 track-and-field areas, 23 swimming pools, 51 stadiums, more than 300 soccer fields, along with hundreds of volleyball, basketball, and gorodki courts. During the period of preparation for the 1980 Olympics the sports base has been further supplemented by a number of custom-built facilities. The builders have received good marks for putting into operation the Palace of Sports for wrestlers, the "Trud" DSO (Volunteer Sports Society) Yacht Club, and the "Dinamo" Rowing Base. In May work must be completed on the medical-physical-education dispensary, with a capacity of 1000 visits per shift.

The achievements of athletes wearing the emblem "L" in competitions at the highest level are generally well known. During the last five years alone people from our city have won 242 prizes at World and European Championships. The honored title of Olympic Champions is borne by 58 Leningraders. And there is no doubt that, having such an excellent training base, the

Construction nearing completion on the "Gavan'" tourist hotel on Sredniy Prospect, Vasil'yevskiy Island.

representatives of the city on the Neva River--those who are candidates for the country's Olympic team--will worthily pass on the baton of sports glory.

Within the plan of preparing for the 1980 Olympics a great deal is being done in order to conveniently place the tourists; more than 40,000 of them are expected. During the first few days of July the doors of all the city's hotels and 16 specially equipped student dormitories will swing wide open for them. Unique complexes are being created for the convenience of the arriving tourists; it has been decided to concentrate in the hotels and dormitories points of everyday services, trade, theater box-offices, referral and information services.

Now an extremely hectic period has ensued. Into the hotels where the necessary repairs have been completed new furniture and the needed equipment are being delivered, while the appropriate decoration of the interiors and the rooms is being carried out. There is an expanding front of operations, engaged in the construction of the new hotels "Sportivnaya," "Gavan'," "Yenisey," and in modernizing the "Oktyabr'skaya." It is difficult, however, to liquidate the lag which has been allowed. Nevertheless, this must be done no matter what. Because their turnover to the state commissions is envisaged for the end of the first or the beginning of the second quarter. If delays occur through the fault of the builders, then the service personnel will hardly succeed, in the final analysis, in being well-prepared to welcome our city's guests.

The feeding of the athletes and tourists who will arrive in Leningrad during the Olympic Games will be organized at 75 restaurants, dining-rooms, and cafes. Many of them (i. e., those in the hotels "Sovetskaya," "Astoriya, "Leningrad," Yevropeiskaya," and others) already today are prepared to receive guests. The construction of restaurants in the hotels "Kareliya," "Gavan'," "Sportivnaya," and the motel-campgrounds in Ol'gin is still continuing.

Workers of the "Gassvet" Combine have affixed standard emblems on the facades of the everyday-service enterprises. Display windows have been renovated, and trading halls have taken on an up-to-date appearance. The Olympic symbols have become a constant element in the format. The "Rostorg-reklama" Combine has assumed the responsibility for these concerns.

All the restaurant and dining-room personnel will be issued special uniforms. Standardized dress will also be established for the health-care and everyday service workers. The Olympic uniform has been created by artists of the "Leningradodeshda" Administration. It will be made of lightweight fabrics with a characteristic presence of all kinds of sports details. Representatives of each occupation will receive clothing in a definite style and color.

The questions which are on the agenda in connection with the impending Olympics are on such diverse planes that it is difficult even to enumerate them. The most important of these is, perhaps, providing transportation service to the participants in the soccer tournament, along with the officials, journalists, and numerous tourists.

Work is close to completion on the principal projects connected with the activity the transport organizations. This is also the case with regard to the modernization of the old part of the Finland Station and the construction of new bus and taxi parking lots, as well as facilities around the new service stations.

The Baltic Maritime Steamship Line will designate the ships which will bring us tourists from the United States, Canada, and the European countries. At the present time new wharves are being built.

Preparation of transportation services for the Olympic Games is being carried out in Leningrad according to plan. But there is still quite a bit to be done in the time remaining. Particular attention must be paid to modernizing the "Pulkovo-2" Airport, where it is proposed that foreign tourists be received.

We must exhibit everywhere a genuine care that the level of services provided for all who come to our city during the festive days of the 1980 Olympics is as high as it should be. It is a matter of honor that every Leningrader bear this constantly in mind.

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METALWORKING EQUIPMENT

OVERALL REVIEW OF MACHINE BUILDING INDUSTRY OFFERED

Data Summarized

Moscow EKONOMICHESKAYA GAZETA in Russian No 6, 1980 p 10

[Article: "The Development of Soviet Machine Building"]

[Text] The production associations and enterprises in machine-building and metalworking industries number more than 8,500. More than 26 percent of the total industrial output of the country is produced by them.

USSR machine building holds second place in the world for the total volume of product output and first place for production of many forms of equipment and machinery such as tractors, combines, diesel locomotives, electric locomotives, machine tools and other kinds of products.

The volumes of machine building and metalworking products for the first 4 years of the current five-year plan has increased by 30.8 percent. About 8.5-million automobiles and 940,000 machine tools have been manufactured on R 5.9 billion worth of low-voltage equipment. In the years 1976-1979, about 14,000 new types of machinery equipment and instruments were put into production and more than 7,000 obsolete items were removed from production.

The production costs of industrial output was reduced by approximately R 3 billion in 1979 due to an increase in the technical level of production. About 4,000 men were transferred from unproductive manual labor to mechanized work.

The production of machine building and metalworking products will increase in 1980 by 6.5 percent in comparison with last year. The priority growth of the output of machines and equipment for fuel and energy sectors and for agriculture, for mechanization of heavy and labor-intensive operations, loading-unloading and transport operations and improvement of working conditions has been specified. Thus, the output of installations for drilling clustered wells will increase by 23 percent, providing for an increase in labor productivity by a factor of 1.3. Production of machine tools with numerical program controls will increase by 14 percent, including a

30 percent increase for multi-operational tools, and production of automatic manipulators with programmed control will increase by a factor of 1.7. It has been planned to remove more than 1,500 obsolete types of products from production.

One may read in detail about the development of the sector in the article "Machine Building--The Foundation for Technical Progress" in PLANOVOYE KHOZYAYSTVO, Vol 1, 1980.

Forge, Press Machine Building

Moscow KUZNECHNO-SHTAMPOVOCHNOYE PROIZVODSTVO in Russian No 1, Jan 80 pp 1-4

[Article by D. I. Polyakov, deputy minister of the Machine Tool Manufacturing and Instrument Industry of the USSR: "The Tasks of Forge and Press Machine Building in 1980"]

[Text] Fifteen years have passed since the time of the October (1964) Plenum of the CPSU Central Committee, which became a historic landmark in the life of our Party. The face of our country's economy has changed in many ways during the years which have passed. The fixed capital of the economy increased by a factor of 2.8, by R 1 trillion in 1979 as compared with 1965. This increment is almost double the value of capital funds created for all the preceding years of Soviet power.

The volume of industrial production has increased by a factor of 2.6 during this time, and in sectors which determine scientific-technical process to the greatest extent (machine building, electric power engineering, and the chemical and petrochemical industries), it has increased by a factor of 3.9.

About 5,000 large industrial enterprises have been put into operation during the three five-year plans. In connection with the renovation of operating plants and factories, this means the creation of an essentially new production apparatus for the country in which the achievements of science and foremost engineering decisions are embodied.

The increase in labor productivity in 1976-1979 permitted us to save the labor of more than 62-million persons.

The Soviet people are even more fully sensing the fruits of their revolutionary requests and labor achievements. The actual income per person exceeded the 1965 level by a factor of 1.9 in 1979, and payments and benefits from public consumption funds increased by a factor of 2.3. More than 160 million persons moved into new apartments and improved their housing conditions.

More than 3.4 million machine tools and 720,000 forge and press machines have been delivered to the national economy during the past fifteen years. Of the total quantity of metalworking equipment, 2.7 million machine tools and 485,000 forge and press machines have been delivered to the national economy by enterprises of Minstankoprom [Ministry of the Machine Tool Building Industry]. Essentially, a large part of the powerful stock of metalworking equipment which the national economy has at its disposition was formed during the years of the 8th, 9th and 10th Five-Year Plans.

The achievements of the national economy during the 10th Five-Year Plan are more significant. Machine building developed at more rapid rates during 1976-1979. The growth in the volume of commodity production output throughout the machine-building ministries was 30.8 percent in 1979 as compared with 1975, and the average annual production increment rates were 6.9 percent. A 75 percent increment in output was achieved in 1979 due to an increase in labor productivity.

As was the case in previous years, much attention has been devoted in 1979 to fulfilling the plans for new technology. More than 750 new types of machine-building products have been put into production. Towards the end of 1979, the state Seal of Quality had been awarded to more than 11,000 machine-building items.

During the four years of the 10th Five-Year Plan, 937,000 machine tools and 218,000 forge and press machines including 754,000 machine tools and 152,000 forge and press machines by enterprises of the Minstankoprom, were delivered to the national economy.

In 1979, 229,500 machine tools (with a value of 1.889-billion rubles) were manufactured, including those produced by enterprises of Minstankoprom for a total of 1.6345-billion rubles. Output of machine tools increased in value by 39 percent in comparison with 1975. Production of forge and press equipment in 1979 was 56,500 units worth 566.4-million rubles and it increased in quality by 11.9 percent and in volume by 49.3 percent in comparison with 1975. Among these, the output of forge and press equipment (FPE) at enterprises of Minstankoprom was 39,580 units with a value of R 495.4 million or, 70 percent in quantity and 87.5 percent in volume, respectively, of the total production of FPE throughout the country.

An 8.9 percent growth in the volume of production output in comparison with 1978 was provided for in 1979 by Minstankoprom, including 7.3 percent growth for machine tools and 9.6 percent for forge and press machines. Moveover, 76.4 percent of the total increment of production output was obtained because of increased labor productivity; 850 experimental prototypes and 770 equipment series were manufactured, while 250 obsolete items were removed from production. More than 150 assignments of the works programmed for solution of scientific-technical problems were carried out. Output of products in the highest quality category was 31.5 percent in the total volume of commodity goods production.

Specific work to increase the technical level of production has been performed by enterprises and organizations of the industries during the elapsed period of the 10th Five-Year Plan: 118 fully mechanized workshops and sectors, 422 mechanized flow-line and automatic lines, about 2,500 machine tools with digital program controls (DPC), more than 200 automated manipulators, 275 fully mechanized warehouses, more than 2,500 units of hoisting equipment, conveyors, and transporters, etc., have been incorporated.

A progressive tendency for increasing the percentage of FPE in the total output of metalworking equipment has been established in the national economy: from 15.8 percent based on quantity in 1964 to 17.9 percent in 1975 and 19.8 percent in 1979.

A change in the output structure is the most important feature in the development of forge and press machine building during past years, particularly during the 10th Five-Year Plan. Thus, the relative importance of automated equipment in the total output of the Minstankoprom's enterprises increased from 10.1 percent in 1965 to 15.2 percent in 1975 and 22.1 percent in 1979 (based on quantity). Moreover, the output of universal forge and press machines equipped with means of mechanization and automation increased by a factor of 3 in 1979 as compared with 1975, including machines and units by a factor of 6.3; output of automatic equipment increased by a factor of 1.25, including automatic presses for metal powders by a factor of 1.5; output of heavy and single-design machines increased by a factor of 1.3 and that of automatic lines by a factor of 1.5.

Output of the highest category of FPE increased from 8 models (1.8 percent of the total output) in 1972 to 41 (6 percent) in 1975 and 150 (22.6 percent) in 1979. The volume of production of this equipment increased from R 4.66 million (1.5 percent) in 1972 to R 31.3 million (7.5 percent) in 1975 and R 229 million (33 percent) in 1979.

Improvement of the output structure is being achieved on the basis of equipment of new nomenclature being put into production according to new technology plans. According to the new technology plan, series production of 84 models of new forge and press machines, automated units and standard automated lines has been started for 1979 and 21 models of obsolete equipment have been removed from production.

Preference has been granted to creation of more progressive types of equipment in the plans for new technology for 1979, as was the case in the previous years of the 10th Five-Year Plan: equipment with program control; automated units, including those for stamping work by the piece and machines and units for producing precision stamping.

The increased productivity of all forms of equipment is a characteristic feature of the newly assimilated equipment. The most significant growth in productivity (by a factor of 2-3) is being achieved by the creation of automated units based on universal equipment.

A savings in metal (20-30 percent and greater) is achieved primarily because of the creation of equipment (machines and units) to produce stampings using hot and cold drop forging methods on multiple piston hydraulic presses and presses for isothermal stamping, radially squeezing machines, multi-position automatic presses for cold drop forging, etc.

An increase in the productivity and the stampings and articles being stamped is being provided for by creating equipment with programmed control.

The development of a product list of automated units based on presses with industrial robots is solving an important problem of automation when working on single-unit stamping.

It must be noted that creating and putting FPE with programmed control into production was begun in the 9th Five-Year Plan. Twelve standard specifications for eight types of FPE with numerical program control and five standard specifications for three types of FPE with digital program control have been developed. One hundred and fifty two FPE units with program control have been produced, including 90 FPE units with numerical program control. It has been planned to produce 37 standard specifications for 16 types of FPE with numerical program control and 8 standard specifications for 4 types of FPE with digital program control during the years of the 10th Five-Year Plan and to produce 1,890 FPE units with program control in all, including 630 FPE units with numerical program control.

Creating and putting industrial robots and units based on them into production for forge and press production was begun during the 10th Five-Year Plan. It has been planned to create and place 19 standard specifications for seven types of FPE with industrial robots into production and to produce 250 units in all.

In 1979 experimental prototypes of various types of equipment with program control were put into production by plants and production associations of the GPO [expansion unknown] "Soyuzkuzmash" and the Experimental Scientific Research Institute of Forge and Press Machine Building: a sheet-metal bending machine with a rotating bending beam with numerical program control for plates 4.5x2500 mm; a two-row bending machine with numerical program control with means of mechanization for bending shells from a plate 2.5x200 mm; a four-row bending machine with numerical program control for bending shells from plates 10x5500 mm; a hydraulic machine with a force of 16 ton·f with numerical program control for making accurate cylindrical parts with an extended axis with means of automation; radially squeezing machines with feed and loading devices with program control having a force of 20 and 50 ton·f; a single-position machine with numerical program control for casting thermoplastics under pressure with an injection volume of 500 cc. Experimental prototypes of a number of automated units with industrial robots (manipulators) have been put into production: an automated unit based on a hot drop forge crank press with a force of 4,000 ton·f and a manipulator with a lifting capacity of 40 kg; a unit of equipment based on a crank-and shaft--sizing press with a force of 400 ton·f and a manipulator with a lifting capacity of 10 kg; an automated unit on an open single-crankshaft press with a force of 16 ton·f and an industrial robot with a lifting capacity of 1.25 kg.

Among those which have been put into production, there are various automated machines and units, machines and units for producing precise stampings, including a simple-action, closed four-crankshaft press with a force of 1600 ton·f with a self-restoring safety device, micro-drive and a device for accelerated replacement of the stamps; a 400 ton·f press for separating operations with means of automation; sheetmetal cutters with an inclined blade for plates 6.3x6100 mm; a punch press with a 3-punch head and a coordinate table rated at a force of 63 ton·f; a high speed automatic blanking press with overhead drive with a force of 400 ton·f; a multi-cylinder hydraulic press for flashless stamping with a force of 1000 ton·f; a hydraulic press for isothermic stamping with a force of 1600 ton·f and a 2-row bending machine for bending shells from plates 4x1250 mm with means of mechanization.

Series production has been started on automated units based on open single-crank presses with a force of 63 ton·f and industrial robots with a lifting capacity of 10 kg; units based on open single-crank presses with a force of 160 ton·f and industrial robots with a lifting capacity of 10 kg; various models of new types and modernized automatic units: multi-positional for cold three-dimensional drop forging with a force of 630 ton·f; high-speed automatic blanking presses with overhead drive in a unit with all means of automation; hydraulic units for finishing blanking with a force of 250 ton·f with a belt-feeder; bending machines for manufacturing complex parts from wire up to 9 mm in diameter; multi-positional cold-upsetting nut presses of increased productivity with a cutting diameter of 10 mm; four-position cold-upsetting presses with devices for removing facets and undercutting ends and thread-rolling presses for bolts 20 mm in diameter, etc.

Series production has begun for hot drop forge crank presses with a force of 1600 ton·f with means of automation (loading the first position), presses to press artificial diamonds with a force of 2000 ton·f, hydraulic pipe bending machines for pipes 250 mm in diameter, hydraulic presses for manufacturing sharply bent fittings, automatic lines of increased productivity for lengthwise cutting of broad roll material 0.8-2.5 mm thick and 1600 mm wide, etc.

Centralized production of standardized assemblies cooperation received further development in the sub-industry and specialization was improved.

The industry's tasks for 1980 are determined by the specific natures of this, the concluding year of the Five-Year Plan, preceding the following, the 11th Five-Year Plan. In connection with this, fulfillment of the tasks of the 10th Five-Year Plan set by the XXV Congress of the CPSU should be insured and tasks for the 11th Five-Year Plan should be developed and finalized for all of the plants, production and scientific-production associations and technical design bureaus of the industry.

The production of machine tools throughout the Minstankoprom in 1980 will grow by 7.6 percent based on value in comparison with 1979, including production of machine tools with numerical program control increasing by 18.3 percent, production of multi-operation machine tools with magazines for automatic replacement of the cutting tool will increase by 43.7 percent, output of forge and press machines will increase in value by 11.5 percent.

Work will be continued in 1980 on improving the output structure of forge and press equipment in the direction of increasing the production of automated equipment, equipment for producing precise stamping and heavy and single design equipment.

According to preliminary data production of automated forge and press equipment at enterprises of the Minstankoprom is 26 percent of the quantity and 51 percent of the value of the total equipment output in 1980. Production of automated equipment will increase by a factor of 1.8 in comparsion with 1975 with regard to quantity and by almost a factor of 3 in regard to volume. Output of single position automated units will increase in quantity by a factor of more than 14, of machines with program control by a factor of more than 5, of heavy and single design machines by a factor of almost 1.5 and of automatic presses for metal powders by a factor of 1.8, etc.

As is known, the course defined by the 25th CPSU Congress towards broad use of intensive factors in the development of the national economy will be continued. In association with this, the equipment put into production in 1980 in accordance with plans for new technology should create a definite reserve for improving FPE output structure during the 11th Five-Year Plan.

Developing technical specifications for 90 machines, units and standardized automatic lines, manufacture of 88 samples and putting 79 unit series into production has been called for in 1980 by the plan for new technology. The overwhelming majority of the machinery being put into production is automated equipment.

It is anticipated that in 1980 experimental samples of such machinery and units as sheetmetal bending machine with a rotating bending beam for plates 1600x6 mm with numerical program control, a sheetmetal bending press with a force of 400 ton·f with numerical program control, an automated unit with numerical program control based on hydraulic cutters with an inclined blade for plates 12-32 mm thick and a hydraulic pipe-bending machine with numerical program control for pipes 160 mm in diameter. It has been planned to broaden significantly the front of operations for creation of equipment with industrial robots, and putting a plate stamping unit based on an open, simple-action, single crank press with a force of 50 ton·f and an industrial robot with a lifting capacity of 10 kg, a hot drop forging unit based on a press with a force of 2500 ton·f and a robot with a lifting capacity of 10 kg, a plate stamping unit based on an open, simple-action, single crank press with a force of 6.3 ton·f and a robot with a lifting capacity of 0.63 kg and a a 3-armed robot for servicing open single-crank presses with a force of 63-100 ton·f with a lifting capacity of 5 kg into production has been called for.

Putting new types of automatic equipment and automated equipment into production has been called for: an automatic unit for balls up to 32 mm in diameter, horizontal automatic units for cold extrusion with a force of 25 and 63 ton·f, a hot drop forge, multi-position automatic unit for rod-type articles with a rod diameter up to 27 mm, hot drop forge multi-position automatic nut presses with nut thread diameters of 16 and 27 mm, an automatic, multi-position, aggregate (sectional) sheet stamp crank press with a force of 2500 ton·f, automatic hydraulic presses with a force of 160-250 ton·f with increased productivity for pressing articles from metal powders, open-side hydraulic presses of various forces with a slide bar, a revolving table and a device for fine-trueing, an automated upsetting machine with vertical die parting with a force of 250 ton·f, a dual-action hot drop forge crank press (for flashless stamping in partable dyes) with a force of 1600 ton·f (800/800 ton·f), etc.

Series production of equipment units is beginning in 1980: based on a crank-and-shaft sizing press with a force of 400 ton·f and a robot with a lifting capacity of 10 kg; based on screw presses with a force of 160 ton·f and a robot with a lifting capacity of 1.25 kg with numerical program control for bending shells of variable curvature; based on a press with a force of 250 ton·f with circular executive mechanism for drop forging articles of material in bars; based on hydraulic cutters with a force of 315 tons for cutting up scrap metal and of units with various standard specification based on open single crank presses for work from metal strips.

Among the equipment, series production of which is geginning in 1980, are the following: four-position cold drop forging automatic units with devices for undercutting the end and removing a facet and a thread rolling device for a rod 8x80 mm, automatic cold drop forging nut units of increased productivity for nuts up to 6 mm in diameter, automatic roller-and-ring thread rolling units for articles 3-6 mm in diameter, semi-automatic machines for hot coiling of springs made from wire 25 mm in diameter, automatic presses with a force of 10 ton·f for cutting out grooves in stator and rotor leaves, automatic mechanical equipment for calibrating metaloceramic articles with a force of 63 and 100 ton·f, high-speed automatic units with overhead drive with a force of 250 ton f, automatic lines for cross-cutting roll materials up to 2.5 mm thick and up to 1600 mm wide, automatic lines with grab-bucket feed for consecutive stamping of parts based on open single crank presses with a force of 1600 ton·f and a manipulator with a lifting capacity of 1.25 kg.

It is necessary to consider that just the standardization of articles and specialization and concentration of production in user industries will create the prerequisites for broad application of highly efficient automated forge and press equipment and epuipment to produce precision stampings and articles insuring increased labor productivity and savings of metal.

The highly efficient forge and press machinery with program control and units based on presses and industrial robots occupy a particular place among the diverse categories of automated equipment, the production of which is specified to be developed at an outstripping rate during the 11th Five-Year Plan.

The significant development of production of these progressive types of FPE is specified during the 11th Five-Year Plan, as is creation of the scientific-technical reserve for their further development during the 12th Five-Year Plan.

It has been planned to bring series production of more than 60 standard specifications for FPE of 18 types with numerical program control up to greater than 100 units per year in 1985 and to produce more than 2000 machines and units with numerical program control in all during the years of the 11th Five-Year Plan. Bringing series production of 25 standard specifications of FPE of 9 types with industrial robots up to 600 units in 1985 and to more than 1800 units and automatic lines with industrial robots in all during the 11th Five-Year Plan is called for.

Moreover, the tasks of expanding the products list of automated equipment being produced which is designed according to the various nature of initial materials (strips, sheets, piece stampings) as well as the creation of specific efficient equipment for small series production loom before the industry.

Putting equipment units for manufacturing the stampings for the most important machine building articles is related to one of the tasks looming before the industry.

It is necessary to continue realization of measures to increase the technological level and quality of equipment being produced, to increase the productivity and reduce the metal content and the power capacity of forge and press machinery. Items being supplied as a set occupy an important place in this work. The press builders are waiting for active participation from the USSR Ministry of Electrical Engineering and Energy Machine Building, the USSR Ministry of Instrument Making, Automation Equipment and Control Systems, the Ministry of the Electronics Industry and the "Soyuzgidravlika" VPO [expansion unknown] in this common matter.

The achievements of the domestic electronics industry in the area of creating and putting an elementary base for building control devices for various projects into production permit us to pose the question of the broad introduction of electronic technology into control and inspection of the work of FPE and the production processes of OMD [expansion unknown].

It is known that to a great extent the efficiency of the industry's work is determined by the staff, the level of organization and the activity of engineering services, primarily the designers. The use of computer technology is presently a determining factor in their work.

Analysis shows that in individual scientific and technical and design organizations, and in the design bureaus of forge and press machine building plants and production associations, computer technology is being introduced to improve the design processes and to increase the technical level of research efforts. A number of operations modeling forge and press equipment, operations insuring well-founded and optimal engineering solutions at design stages, have been performed on a computer at the Experimental Scientific Research Institute of Forge and Press Machine Building, and a set of programs for standardized engineering calculations has been developed.

About 130 programs for kinematic, rigidity, strength and energy calculations have been created by the Azov SKBKO [Special Design Bureau of Forging Equipment] and the design services of the "Kuzmash" Scientific Perduction Association, the Voronezhskoye Production Association for Production of FPE, the Azov Automatic Forge and Press Plant, the Barnaul Mechanical Press Plant, the Odessa Production Association "Pressmash" and certain other organizations.

There are small "MIR" and "NAIRI" computers in the subindustry which are used to automate simple engineering calculations and to model the dynamics in the operation of units of forge and press equipment. In individual cases, the "MINSK-32" computers of average capability with which the automated control systems of the enterprises are equipped are used to solve more complex problems.

However, the state of poerations to automate design processes and the level to which computer technology capabilities are available in forge and press machine building may still not be considered satisfactory. It is still necessary to broaden the experience of using computers in design practice, to replace the computer technology of obsolete models for creating efficient program systems, automated calculations and blueprint and graphics work. It is necessary to take steps for the development of operations to automate design, to coordinate the efforts of the individual developers of SAPR [expansion unknown], to strengthen the methodological and organizational management of these operations and to insure a united technological base for SAPR in forge and press machine building.

The realization of the decree of the CPSU Central Committee and the USSR Council of Ministers "On Improving Planning and Strengthening the Effect of the Economic Mechanism on Increasing the Efficiency of Production and

Quality of Work" must be related to the important tasks of the industry in 1980. The accomplishment of new measures developed by the Party and the State will raise our management to a higher level.

The gradual conversion to broad introduction of the indicator of pure output (normative) on the basis of which the growth of production volumes and labor production will be planned and the wage fund will be formed as well are among the most important measures for increasing the level of planning. The use of normative pure output in planning is directed toward increasing the efficiency of production and work quality and toward a more complete use of the possibilities and advantages of Socialist production. The indicator of normative pure output as a reflection of newly created value expresses the results of the individual efforts of labor collectives, eliminates the interest in the growth of material consumption of production, and promotes an objective evaluation of the activity of associations and enterprises.

As is usual when these are big changes in the economic mechanism an examination and development of new wholesale prices which measure more faithfully the expenses of public labor to manufacture a product are planned for 1980. The principle of price reduction per unit of useful effect dominates in this work. It is necessary to stimulate production of highly efficient articles and it is necessary to place a reduced profitability on obsolete products.

The solution to the problems confronting the sub-industry are possible only given the coordinated work of all the collectives which insure total use of resources, an increase in production efficiency and work quality. It is necessary to use modern technology and with numerical program control widely to improve technology and to create specialized sectors. It is necessary to insure the maximum load for industrial equipment.

Fulfillment of the tasks and the Socialist commitments which were made and the creation of the prerequisites for the sub-industry during the 11th Five-Year Plan is the most important task for specialists in the sub-industry for 1980.

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METALWORKING EQUIPMENT

INTRODUCTION OF NUMERICALLY-PROGRAMMED MACHINE-TOOL TECHNOLOGY

Moscow SOVETSKAYA ROSSIYA in Russian 21 Dec 79 p 2

[Interview with K. M. Tarasov, general director of the Ryazan' Machine-Tool Association, by V. Kolobov; date and place of interview not given]

> [Text] Machine tool construction is called the heart of machine construction and is of crucial importance for the technical modernization of the entire national economy, as was emphasized at the November (1979) Plenum of the CPSU Central Committee. In conformity with the resolutions of the 25th CPSU Congress session of the Supreme Soviet of the USSR adopted a plan for the final year of the 10th Five-year Plan, which envisages accelerated growth of equipment production, above all, machine tools with CHPU, numerical programmable control. K.M. Tarasov, the general director of the Ryazan' Machine Tool Association, spoke to SOVETSKAYA ROSSIYA'S correspondent on ways of solving this huge national economic problem.

[Question] Konstantin Mikhaylovich, it would seem worthwhile to understand the sources of the creation of machine tools with numerical programmable control, for it is not said in vain: in order to understand the present and to predict the future one must know the past.

[Answer] Sure, to glance back at Soviet machine-tool construction would not be a bad thing. Way back in 1958 our country showed a machine tool with CHPU for the first time in the world at the Belgian Universal Exhibition of Machine Tools and received a gold medal for it. This machine was not from Ryazan', but we were even then doing research. It wasn't easy. And curious things sometimes happened. A panel with digital indicators was attached to the ordinary turning lathe. The program was recorded on magnetic tape. The workers christened the new device "gramophone" for some reason. The tape easily picked up any electrical interference, which created a lot of puzzles for the experimenters. The program was recorded in Moscow, at the Scientific-Research Experimental Institute of Metalcutting Machines. Coming from there required one to take the bus, streetcar and subway. There are plenty of electrical pulses on these kinds of transport. After returning and starting up the tape the researchers often became very frustrated.

However, we don't like to recall those times; evidently, that was a necessary stage in the development of lathes with numerical programmable control.

The chief engineer of the plant, who is now the general director of the Ivanovo Machine Tool Construction Industrial Association, V. P. Kabaidze, headed the group of colleagues in this department. Energetic and quick-witted assistants worked with him. The then chief technician, now deputy chief engineer of our association Ye. V. Bliznyakov, his deputy Boris Chekanov, the director of the research laboratory R. B. Margolit, machine setup man Anatoliy Mokhov and several others.

Among the enthusiasts of the new field was the director of our central board V. D. Glukharev. The construction of machine tools with CHPU owes a great deal to his energy and profound engineering convictions in the validity of this concept. Sometimes I would phone him and say: "Are the drawings ready, when will you send them for inspection?" "Only the drawings? Vyacheslav Dmitriyevich would joke. But in that joke there was a hint of impatience: "Sending them isn't necessary. I'll come myself." And he came, but not alone, but with the directors of almost all the plants of the central board. He led a dynamic meeting, listened to everyone's opinion, and at the end instructed the manager of each enterprise to make certain units not for a single test machine, but for an entire series, 28, immediately. In this way he made the performers interested in rapid and conscientious fabrication of the units, and he promised delivery of these new machines. And the units were made within 1 year straight from the drafting specs. All we had to do was to gather them up. Some plants now have enough of that series. But we put out 300 units of such machines with CHPU and they have already been taken from production. The designers progressed. Our current machines are third generation ones.

[Question] The manufacture of the first machine with numerical programmable control is compared to the appearance of the first artificial satellite of the earth in importance for machine construction.

[Answer] Any comparison, of course, leaves much to be desired. But machines with CHPU are a genuinely revolutionary phenomenon. I think that in the future this will be said with more conviction and validity, for such an evaluation is supported by life itself.

A machine with CHPU can be set up again very quickly. It makes it possible to create complex automated lines for small-lot production. In this case labor productivity increases by a factor of 3 or 4, or even more with higher and higher quality.

How important this is can be seen from some examples. Today in the national economy there are 26 percent more turning lathes than turners, and there are 1.6 as many milling lathes as there are milling machine operators. One can easily imagine how great would be the deficit of machine operators if our industry continued to make only ordinary machine tools. That is why the 25th CPSU congress adopted a resolution to assure greater output of machine tools with numerical programmable control. This policy of the party is being carried out in practice. Let us recall: in 1960 only 16 machines with CHPU were made in our country; in 1970 there were 1,588, and in 1976 a few short of 6,000 machines.

But machines with CHPU bring with them not only technical and economic changes, but also social changes, changes in the nature of work and in the consciousness of people. The machine builders quoted the famous saying: "If you deliver machines with CHPU, will you forget to remove the old boss of the shop?" Its meaning is quite clear: a man, who has become used to ordinary machines and to ordinary production habits says that he cannot adjust psychologically and overcome intellectual inertia. At the factory some of us thought, wouldn't it be better to put such machines in one spot, create a special shop and put a young man in charge of it who is not encumbered by outmoded engineering concepts?

The thought was quite tempting. The number of our machines with CHPU constantly increased, eventually passing 100. It has now reached 170 units. Their idle times have reached 12 percent. One could not imagine any worse publicity for the new products. Indeed, each buyer, before deciding to order a machine, as is common with owners, wants to know how such a machine works at the supplier's place. The idea was suggested that V.P. Kabaidze in Ivanovo had gathered machines with CHPU in one shop so as to separate the workers from the old shop, and the idle times went down sharply. It's true that the plant was new, had only just gotten on its feet and was not very large. The adjustment and reorganization could be made quite painlessly.

At our place production was already established and on a large scale. After weighing all the "pros" and "cons" we proceeded in a different manner: we put the machines with CHPU into existing shops by groups and sections as called for by the technology. In the psychological plan we counted on stimulating the interest and desire of each machine operator to work on machines with CHPU and to stir up rivalry for the opportunity to work on them. Today, the machine constructors of the country refer to the ways of utilizing machines with CHPU, for purposes of simplicity, the Ryazan' and Ivanovo ways. The Ryazan' way, as the minister A. I. Kostousov noted at a conference, is best suited for large established plants, and the Ivanovo way is preferable for newer and smaller plants.

For a long time there was a belief that anyone can work on a machine with CHPU, even a boy or girl. All one has to do is to press buttons. There's very little to be learned. But the "just push" approach turned out to be false. The best version is that the high level of education of a machine operator is multiplied into good experience.

Inexperienced boys and girls, regardless of their knowledge of physics, mathematics and the general principles of the operation of a system of numerical programmable control, could, in some unforeseen circumstances, become confused and push the wrong button. A serious social problem also arises. These boys and girls, yesterday's tenth graders, who are not yet married and still living with their parents, would think a salary of 120 rubles a month a fortune. And machine damage would concern them only from a conscience viewpoint.

We tried to find operators who were sceptically minded, but also experienced. And we did not err in doing so. Everything went well. Once they mastered the new machines, veterans of the ordinary machines, which included the entire shift, no longer even wanted to look at the old machines. Transition to machines with CHPU became essentially an encouragement and an expression of the recognition of the merits of the machine operator and his professional skills. And, of course, it became possible to make the operator responsible for tightening up discipline and to heat up the healthy competition even more.

Damage became less. But even if it did occur, an experienced operator or metal worker could not eliminate it, even when it was not complicated: he did not have the knowledge. Why would such skills be lacking in operators with a high general education and who had already acquired operating experience. Numerical-control systems require special engineering prepration. Under the pressure of circumstances we introduced the position of "repairman-engineer" in place of the position of "engineer-repairman;" i.e. we gave it a worker's image and got permission to raise the salary. Evidently, there is something here for the USSR State Committee on Labor and Social Problems to give thought to.

[Question] Konstantin Mikhaylovich, about 3 years ago you and other industry specialists took party in a discussion of why certain plants are not rushing to acquire such machines. Among the reasons given were the high costs, the weak service organization, and the inadequate reliability. How have these problems been solved as of today?

[Answer] You are referring to the conversation at the "round table" which was reported by the magazine "Economics and Organization of Industrial Production?" Well, a long time has passed since that meeting, and matters have not stayed the same, of course. Through a reduction in manufacturing difficulties for the machines and related equipment and a growth of serial production, their costs have become significantly less. For certain machines of our plant, for example, the cost has been reduced to one-third its original cost, while their reliability has increased. Formerly, for each machine with CHPU which we produced, we shipped it out only after long, trouble-shooting sessions; i.e. with a large group of specialists participating. Now this process proceeds in an orderly production manner. During all these years we have improved the relations of suppliers and customers and the system of maintenance for the machines with CHPU, or, as we say now, the service.

The maintenance and operation were made difficult because the ministry or department which received a batch of machines with numerical, programmable control, split them up among various plants according to the principle "one pair of earrings for each sister." It often happened that the new machines were in the position of poor relatives. Now, sections of such machines have been created at plants. And this has required special treatment for them, the creation of special services for operation and repair.

In addition, the manufacturing enterprises, including our association, have created special service groups which we now call external assembly sections. Such groups have completely taken on the assembly, start-up and adjustment of devices with the machines. They had over the machines in operating order. They teach the personnel of the customer's plant to operate, set up and wire them. Moreover, at our main plant, for example, almost from the first years of the production of machines with numerical programmable control there have been courses offered which provide instruction in the use of machines with CHPU for workers, technicians and mechanics from the customers' plants.

In continuing to increase the efficiency of machines with CHPU and in improving the system of their maintenance, our ministry recently created the All-Union Association "Central Programmable Adjustment." It has the responsibility for adjustment and effective utilization of all kinds of machines with CHPU which are made by Minstankoprom.

But in this connection the question arises: Will the service groups created by the manufacturers leave their jurisdiction or not? Their removal from the plants is highly undesirable. At present, through them the plant has direct contact with the customer and receives feedback, which enables the plant to introduce corrections into the design of machines and associated parts, and to quickly eliminate defects. Remove these groups from direct jurisdiction of the manufacturer and their responsibility fo their product and the honor of their brand name will diminish.

[Question] So that is what went on in bygone days. Shouldn't we glance at the situation today?

[Answer] We're not only glancing at it, but we're actively preparing it. I hope that we have learned something; at the plant the machines of unusual design are the so-called machining centers. Leningrad has sent one, Ivanovo has sent one, and we're making ours in cooperation with the Czechoslovakian machine builders, withing the scope of the Complex Program of Socialist Economic Integration of CEMA member countries.

There is the highest degree of modification of machines with numerical programmable control. In the magazine of our first machine with CHPU there were only six tools. In the magazine of the Leningrad processing center there are 100 of them. Do you sense the difference?

They will have the greatest effect, in the common opinion of specialists, in the composition of a complex section which is also controlled automatically. Complex sections with autotmatic system of control is in the near future. We are working intensively on one of them now. In the section being created by us 9 machines with CHPU will replace 39 ordinary ones. As a result here along 95 people will be freed up.

But, it seems to me that it is already time to look objectively into the more remote future. Today we have been speaking all the time about the methods of making ancient machines. The operating principles of modern machines remain the same as those used by their inventor, Andrey Nartov. However, basically different methods such as ultrasound, laser, electrochemical, and electron beam are already well known and have shown a high degree of efficiency. They enable one to attain unique degrees of precision. It is known that in the United States about one-third of machining equipment operates on electrochemical principles. Here it is significantly less.

We must also shift to CHPU devices with mini-computers, which in size are so much smaller than current ones that they can be inserted into the control panel of a machine or attached directly on the housing of a machine. The lag in the technical level of drives, sensors, and programming devices can be explained largely by the fact that their production is not centralized, and is in various ministries. In response to criticisms they can blame one another. I've said once before and I say again: the development of CHPU devices and all of their rigging should be entrusted to a complex institute under the aegis of Minstankoprom. I am convinced that development of this advanced area of machine construction must be accelerated on the basis of the program-goal method and their must be an increase in personal responsibility of executives engaged in this matter, as is required by the resolutions of the November (1979) Plenum of the CPSU Central Committee.

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METALWORKING EQUIPMENT

APPLICATION OF PHOTOELECTRONIC SERVOMECHANISMS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 21 Oct 79 p 2

[Article by I. Rubinskiy, Volgograd]

[Text] This mysterious abbreviation--FESU--first appeared on the pages of newspapers about 15 years ago. It was expanded thusly: photoelectronic servomechanism. It was thought up, like the device itself, by the Volgograd engineers, the brothers S. and Sh. Vayner.

Actually, the thought of automating the work of machines by the aid of a copying device which causes a cutter or a plasma burner to repeat the lines of a drawing appeared a long time ago, before the way, and was developed by various scientists. But given the state of the art at that time, this field was not developed sufficiently.

The situation changed during the post-war years. The Vayners become interested in FESU. They were working at the Volgograd institute NIITmash [Scientific Research, Planning and Design Institute of Machinery Manufacturing Technology] of Minsel'khozmasha [Ministry of Agricultural Machine Construction]. The achievements made by that time in the field of optics and electronics enabled them to create the automatic oxyacetylene gas cutting tool "Strela" based on such a device. Subsequently they began to equip milling and turning machines and other equipment with photoelectronic attachments. The projects of the engineers were written up as an invention, and they were given author's certificates for them. Machines with FESU successfully compete with machines with CHPU in many features. Of course the preparation of a written program (in practice, an ordinary drawing) is much simpler than a numerical one. And manufacturing by FESU, for which even an old-style machine can be equipped is much cheaper than by CHPU. However, arguging the details of it, which in any case is more effective, is the lot of the specialists. But there is one indisputable fact: many enterprises eagerly acquired "Strelas." The savings produced by getting them was great--as much as 10,000 rubles. And, what is even more important, the effect was realized immediately: work quality improved, people were freed up, and there were material economies.

Unfortunately the epic part of our tale comes to a halt there. The new management of the institute where the brother inventors worked decided that their projects were "not in our line of business." The Vayners together with their entire department--17 men--were gladly given refuge by the newly created Volgograd Branch of the Institute of Scientific and Industrial Association "Rhythm" of the same ministry. The necessary working conditions were created anew for them here.

One of the sections of the instrument plant of the Volgograd Tractor Construction Association was equipped with turning machines with FESU. What was the result? I quote the remarks written by the chief engineer of the association V. Balandin: "The introduction of the machines increased the labor productivity and significantly facilitated the work of the men. We achieved an increase in the amount of parts produced without additional capital outlays."

We began to speed up programs for automating other sections of the association, and also at other enterprises. But, again the management changed--this time at the Branch of "Rhythm," and again it was decided to focus narrowly on the familiar concerns.

Of the three departments which were created from the beginning with this new arrangement two remained. Then they were reduced to one. Later even this was converted into a laboratory, and now it has been suggested that it be made into a section. Imagine all this going on, with corresponding reductions in positions and shrinking of the staff of colleagues.

What's the matter? The managers of the "Rhythm" Branch say that, at first glance, the question is quite debatable. They have nothing against the inventors themselves. In the words of the chief engineer A. Zhukov, there is no doubt at all concerning their practical abilities. But their project nevertheless was "not in our line of business."

Today the branch is occupied with creating large automated systems for controlling technological processes (ASUTP) in metallurgy, casting production, and also in supplies warehousing. Modernization or refurbishing of the machines inventory, voluntarily or involuntarily, seems in these circumstances to be "self-serving," because such a project should be taken on by the Ministry of Machine Industry. As they say, the cards are in its hands. I must determine whether this endeavor is is a good one or not. Moreover, the economic effect from the Vayners' projects does not reach three rubles for each ruble spent, which has been established by the Ministry of Agricultural Machinery as obligatory in planning new projects.

Of course, sometimes it is necessary to carry out the arrangements for expensive departments. And it would be simply remarkable if Minstankoprom took up this matter. But there's the trouble: its representatives didn't even come to the plant tests of machines with FESU.. The machine constructors stubbornly hold to the opinion that because, as they say, the main approach to automation of machines is numerical programming, everything else is "from the devil."

Is it really true that because of this the projects which definitely have practical importance must be rolled back? Can one be calm when a good engineering collective may be broken up? Finally, is it economic to disregard a specific benefit only on the basis that it is "not in our line of business?"

Without disputing the arguments put forward by the managers of "Rhythm" branch A. Aparin and A. Zhukov, other points must be mentioned in this connection.

ASUTP, which "Rhythm" is busy with, promise to be excellent. They represent a new, improved technology with maximum automation of production on the basis of computer techniques. As is said, good luck! But developing the documentation alone for such systems requires several years. Getting them into production evidently takes yet more time. For example, the earliest project of the branch, an automated system for the gray iron shop of the plant Rostsel'mash [Rostov Agricultural Machinery Plant] is dragging on into the second decade (it came here from another scientific institution together with the current colleagues of "Rhythm"). This is not a reproach, but rather a statement of fact--such are today's rates for the introduction of ASUTP here.

There is no argument; it is good that "Rhythm" is taking on large tasks in the struggle for technical progress. But in chasing cranes in the sky one, obviously, should not let go of the bluebird in one's hand. Maybe the effectiveness of this "bird" does not go into seven-figure amounts, but it is achieved in one-twentieth the time.

That is what the Vayners are engaged in right now. They not only "push through" their ideas in the scientific press in any way they can, but they suggest ready-made machines to enterprises. The energies of these men is to be envied. At the plant one meets them more often than in the laboratory. If necessary, they themselves roll up their sleeves and pick up a soldering iron or a file.

Regardless of the fact that "Rhythm" is dragging out the discussions with the Volgograd Tractor Plant in every possible way, (Note that this enterprise is the main one in the association and it is experiencing serious difficulties due to a shortage of workers) on certain subjects, the inventors are continuing to carry on theirs on nearly public principles. Such, for example, is the project of automation for welding the axles of the new "DT-750" tractor, whose assembly they intend to begin soon. Such automatic devices will help to free 42 welders. This year they intend to install an automatic device for a vertical press in a forging shop. In one of the mechanical shops of the tractor plant a turning machine with FESU is operating on a program, which assures double superiority in labor productivity in comparison with a machine with CHPU. Fifteen units of equipment with such devices are now operating successfully within the association.

In my opinion, it should not be allowed that all these so very valuable projects gradually be reduced to nil.

I wish to emphasize that I am not proposing to replace large developments by small ones. This would only hurt everything. But it is correct to consider other kinds also. It's hardly worthwhile for a strong creative team to chase around in circles. All the more so since the Vayners and their assistants are asking only one thing: Let them work. But there are no enterprises and institutes of machine construction in Volgograd. What's left to utilize the possibilities of the inventors where they are working today.

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METALWORKING EQUIPMENT

PROBLEMS OF USING ROBOTS IN INDUSTRY

Moscow TEKHNIKA MOLODEZHI in Russian No 11, 1979 pp 28-27

[Article by Yuriy Kozyrev, candidate of technical sciences; and Sergey Zhitomirskiy, engineer: "Here They Are—Robots"]

> [Text] In the resolutions of the 25th party congress and in the recent decree of the CPSU Central Committee and the USSR Council of Ministers on improving planning and the economic management, the idea that a sharp reduction of heavy, noncreative manual labor has become an indispensable condition for further economic growth of our country is persistently offered. In the opinion of specialists, one way to solve this problem is to create an industry of robots. This article discusses the formation of the new branch.

In "Notebooks of a Revolutionary" P. Kropotkin gives an interesting account from year 1858. Here it is:

"From visiting factories I acquired a love for powerful and accurate machines. I understood the poetry of machines, when I saw how a gigantic steam-powered claw, extending out from a sawmill, grabs a log from the Neva and neatly feeds it to a machine which saws the trunk into boards."

Interesting, isn't it? It seems that the prototype of devices which we call robots and industrial manipulators today existed a century ago. However, the pressing need for machines, which replace human labor, arose only at the end of the 1940's, when work with radioactive substances began on a large scale.

At that time there appeared in atomic laboratories mechanical arms which were controlled by operators. A man stationed in a safe area could carry out the necessary set of movements and observe how these movements were mimicked by the working elements of the manipulator, which were in "hot" chambers.

Similar designs were gradually improved. The working elements were equipped with electrical drives, with devices for scaled reflection of forces, and with means for controlling the weight of the objects being moved about, etc. It seemed that the functions of the human-operator could be conveyed to the programming control panel, and the manipulator would become a robot--a universal machine for carrying out any kind of industrial operation.

But this never happened. Industrial robots, the idea of which and whose many principles had been prompted by the preceding development of manipulators, emerged as an independent type of machine. The reason for this was the specificity of tasks which they had to solve.

Laboratory and Shop

Factory conditions differ sharply from those in the laboratory. Therefore, devices intended for operation in a shop must have different technical characteristics: different size and shape of the maintenance area; different rate of displacement of movable parts; different lifting capacity and different stability under external interferences. In a factory a machine is in a medium with increased dustiness, vibrations, electrical and radio interferences. The level of machine maintenance in a factory is lower than in a laboratory.

The very nature of a robot's actions in a shop is different than that of its laboratory counterpart. Thus, a forging-process manipulator must take a red hot billet, transport it to the work area of a hammer or press and, turning it after each blow, assure production of an article of the required shape, This must be done within a specified period of time, otherwise the billet will congeal below the required temperature. Thus, the plant manipulator must be heavier, more productive, more reliable, safer and stronger than its laboratory counterpart which, in turn, is more mobile, more agile and interacts better with the objects being shifted about. The difference here is approximately the same as between the guillotine and surgical scissors.

However, a robot, like its laboratory prototype, is a most important means of assuring safety of industrial operations which produce more accidents (for example, stamping) or which have a harmful medium (hot shops, lines for applying galvanic coatings, painting and sandblasting chambers). On the other hand, if appropriate measures are not taken, the robot itself can be an instrument of increased danger. In this respect the designers must exercise care.

Finally, in production the chief factor is one which is not considered in the laboratory--the economic effect. His Excellency The Experiment becomes king in the research department. One need only put something into the budget, which can always be increased, if this is necessary for solving the scientific problem. But in a plant any innovation must lead to savings in mass labor, assure increased productivity and justify expenditures. Industrial robots are no exception. The same stringent requirements must be met by them as are met by all other means of automation. Thus, there is an attempt at specialising these devices, developing standard-units, modular designs, and creation of machines for a limited number of tasks.

Where Are the Limits of Universality?

What we now call an industrial robot is an automatic, adjustable manipulator with programmed control, which is capable of moving about in space a device or instrument (welding head, paint sprayer, pneumatic drill) and carrying out basic or supplementary technological operations. Such a manipulator is distinguished from traditional means of automation--automatic operators--by its capacity for rapid readjustment.

But there was a time when the authors of serious scientific works tried to describe robots as having technological universality. Engineering thought here and abroad was wasted on development of such devices. On the basis of modern achievements of science and technology the most interesting kinds of robots can be made today. This is possible, but not necessary, because they will be economically inefficient.

Guided by the principle of economic efficiency, the majority of designers are now concentrating their efforts on creating specialized devices with a specific area of application--the so-called targeted industrial robots.

The actions of a welder are analyzed and on this basis a standard unit is developed to carry out welding operations. In its area it must be universal: after the appropriate adjustment and instruction it must carry out any programmed operation of welding. Or the work of a painter is studied, and a robot is created to apply varnishes and paints to details and articles of any shape and size. The same is applicable to placement of billets in the working area of a hammer or press, removal of the machined details and their inspection. Robots are capable of replacing people in maintaining specific groups of machines and casting machines. The diversity of purposes gives rise to designs which differ greatly from one another and which are completely dissimilar to man in external appearance.

If there is a similarity, it is in other respects. The multifaceted possibilities of any man do not prevent him from specialising in a specific area. Such a situation is stored in the world of robots: the limits of universality of every one of them are determined by the area of their application.

From Principles to Application

One of the important scientific and technical programs of the 10th Five-Year Plan envisages the creation of a gamut of industrial robots. This includes manipulators controllable by an operator, which, properly speaking, are not robots, but they do appear in catalogs alongside them. This is a consequence of the commonality of the goal and the great flexibility in carrying out operations in comparison with the traditional means. Recently, hybrid systems have appeared--manipulators which are controlled alternately by a man and an automatic programmed system.

So-called discharging (balanced) manipulators equipped with a mnemonic lever have already been created and are being used in material-handling and warehouse operations. Their kinematics is such that the clamp, which carries a heavy part, precisely duplicates the movements of the operator's hands. Hoists of this kind are very convenient to use.

The PRTS-10 pneumatic robot for loading presses is simple in design. Its arms are nothing but the plungers of pneumatic cylinders. A special pneumatic cylinder turns an upright with its arms to the required angle, another arm raises and lowers it, and finally, a small pneumatic cylinder can turn the clamp by one of its arms 180°. This has already become a classical configuration of a machine for automation of the loading of sheet-metal stamping presses--an operation which is tiring and dangerous.

A robot for loading a set of metalcutting lathes is more complex. A carriage carrying a hinged arm moves along a 12-meter trestle. A combination of three movements--turns of the arm, forearm, and shifting of the carriage--permits the device to transfer the clamp to any point of a wide working area 20 m square. Lifting capacity is 50 kgf. It has numerical programmed control, while the programming is done by the instruction method. Positions through which the clamp is led during adjustment are fixed in the device's memory. Suspended robots, incidentally, are valuable because they require smaller work areas.

If equipment is positioned efficiently during loading of machines, the number of degrees of freedom of robots can be kept to a minimum and its cost can be lessened. This is a problem for whose solution a high degree of mobility of the mechanical arm is necessary. For example, spot welding of automobile bodies. Having six degrees of freedom, a robot can orient the welding tongs and follow the shape of details to be welded which are curved or bent in space. The productivity of this kind of machine is great--up to 100 welds per minute! Of course, during adjustment the robot is shifted more slowly.

So far we have discussed rigidly programmed robots. There are more of such machines than any other kind, and in many areas of application they have no competition. However, there are situations when the initial position of an object, which a robot must act on, is not clearly defined. For example, when loading machinery with billets which have been placed into the usual plant containers.

In a laboratory model actions with unoriented billets were worked up. Simple programming of movements is not enough in this case. The model had to be equipped with sensors, which would give information on the position of the billets, and with a system for computer-based control. Such devices, which are capable of correcting the program of actions depending on the changing external conditions, are called adaptive. Progress in the area of computer technology permits one to hope that soon control systems will become cheap enough for economically advantageous application of such robots in production.

The "Adam-2" manipulator, created under the guidance of professor V. Gurfinkel', has already undergone tests. The arm of "Adam-2" is tactile, and very sensitive sensors are placed in its palm. The device can distinguish a cube from a parallelepiped, a pyramid from a sphere, etc. Such a robot will find application in sorting details and assembly of complex mechanical structures. It is simpler than those which are based on utilization of television sight. Studies are being conducted on creation of devices which even more improved system of control, ones which have elements of artificial intelligence. In this case the role of the human-programmer will be reduced to formulation of the task.

Problems of Introduction

It would be naive to think that one can simply place an industrial robot in front of a machine in place of a man and thereby solve the problem of automation. A machine is connected to other industrial units by numerous transport and informational flows, and these connections, which are handled by the worker-operator, must also be automated. Therefore, the application of robots in industry, in perspective, grows into a problem of creating robotized technological complexes.

Each such facility is an autonomously acting system. It includes one or several units of semi-automatic equipment interacting with the robot and a set of auxiliary devices which assure completeness of the automatic cycle of processing within the complex and its connection with the incoming and outgoing flows of basic production.

There is, for example, a complex based on a semi-automatic turning lathe and a robot. It works in the following manner. The billets are lined up in the beds of the transport agent. The robot places the parts into the machine, and after machining places them in their former position. A cycle is possible in which after machining one side of the part is turned 180° and again is based into the lathe chuck. The transport agent is placed on the cart, which serves as a part of the robot. After putting the next series of billets into its arm, the cart can proceed to the storage unit for automatic exchange of the agent.

In order to create such a complex, modernization of the semi-automatic lathe is necessary. At present they are being made without consideration for the mechanical loading of articles. Of course, it is necessary to automate the clamping of a part, the opening of a locked item, make changes in the system of control for linking up the robot in order to assure actions of the machines in a "dialogue" regime. It is also necessary to provide certain devices for feeding the parts, to assure technical safety, etc. Normally, link up of equipment and a robot runs into problems in plants.

Radical surmounting of difficulties lies in the organization of serial production not of individually taken robots, but of complexes, in order that the customer can receive a debugged system of machines. The serial output of robotized complexes, of course, does not eliminate the serial manufacture of their component parts. The manufacturing plant can and must produce a part of the equipment and associated articles in cooperation with other enterprises.

Until now the serial output of individual robots which have gone through interdepartmental tests successfully have been debugged. These are the "Tsiklon-3B," "Universal-5," "Universal-15M," PR-10, TSRV-50, PRTS-1, MP-7, "Sprut."

The Kovrov Mechanical Plant where 60 robots are already operating has become a pioneer in the extensive introduction of such devices. As a result, in operations where they are used, labor productivity has increased by a factor of 3 on the average (in individual sections by a factor of 5 or 6), and almost 100 people have been freed. The savings in 1978 was 300,000 rubles.

An unusual conveyor has been installed in the new welding section in the pressing department of the Automobile Plant imeni Likhachev. This conveyor is served by 14 robots. The floor, panels and roof of the ZIL automobile are fed at the start of the line, and at the end the already completed, welded cabs roll up to the inspectors.

In all, more than 1,000 universal and specialized industrial robots have been produced in our country in the past 3 years. By the end of the five-year plan their number will exceed 5,000. And anyone who intends to make robot-technical systems his specialty will be interested to know that the preparation of engineers with such skills has been organized at the Moscow Higher Technical Institute imeni N.E. Bauman.

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